Refuge Notebook

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USFWS Kenai National Wildlife Refuge

This volume was compiled in 2016 by Jennifer Peura from the Kenai National Wildlife Refuge's archive of *Refuge Notebook* articles. Formatting has been improved, some hyperlinks (URI's) have been updated, and minor edits were made, but the articles have mostly been unchanged.

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A quick look back, then a look ahead

by Doug Staller

The Roman god Janus was the god of gates, doors, beginnings and endings. That's where we get the name for the first month of our calendar, January, so it's an ideal time to reflect on the year that was and the year that will be. How does that old saying go? "Yesterday is history and tomorrow is a mystery."

Personally my year on the Refuge didn't start until June when I transferred to Soldotna from the treeless tundra of Yukon Delta Refuge. The longer I'm here, the more I am coming to appreciate the stunning landscapes and amazing wildlife of this place.

In January we presented a cooperative study on wildlife mitigation and human safety for Sterling Highway (Mile 58 - 79), Kenai National Wildlife Refuge, Alaska, at the 2007 International Conference on Ecology and Transportation. The conference theme was "bridging gaps naturally" and the Kenai presentation reported on our studies directed at reducing wildlife/vehicle collisions on a portion of the Sterling Highway scheduled for reconstruction that will likely increase traffic speed.

By using radio telemetry studies of collared moose and caribou, researchers have been able to map high density crossing areas that deserve special attention in highway construction to mitigate potential impacts to both wildlife and highway travelers. Refuge Biologist Rick Ernst was the primary author of the study and publication. Contributors include staff from the Alaska Department of Fish and Game, Alaska Department of Transportation, the Federal Highways Administration, Alaska Moose Federation, and the Alaska Department of Public Safety.

In February we held an open house and Winter Fun Day at the Refuge headquarters and the Environmental Education cabin. The 119 people participating had opportunities indoors to engage in family-oriented activities and watch the movie "Stranger in the Woods," as well as to venture outside for a guided snowshoe hike.

In March the five-mile Wolf Lake natural gas pipeline corridor was judged to have achieved its primary habitat restoration goals. The pipeline connects areas of the Refuge roughly between the Swanson River and Beaver Creek Oil and Gas Leases, and accesses subsurface gas resources held by Cook Inlet Region, Inc. Natural revegetation occurred in most places after construction, but special attention was given to stream crossings and hill tops. The final areas restored required planting of natural vegetation and fertilization. The width of the right-of-way is now decreased from the 50-foot wide construction corridor to a 6-foot wide pipeline operational corridor which will facilitate additional natural restoration. As winter came to a close, nearly 800 students had participated in field trips to the refuge.

In April the Refuge hosted a workshop for maintenance staff from refuges across Alaska and nearly 100 home-school students came for a bear education day.

In May, Refuge staff featured Invasive Weeds and Bear Awareness at the Sports Show and the Home Show. We also celebrated ten years of Refuge Notebook articles, with more than 450 articles, all available at http://www.fws.gov/refuge/kenai/.

I'd like to say that summer months blended together but it was more like a blur. Some of the highlights (in addition to learning how to pronounce the name of Bottinintnin Lake and becoming a full-fledged member of AARP) included a quiet one on the fire front locally, due to cool weather. This was fortunate because our crews were needed in Nevada and California where the fire conditions were severe. Refuge Officer Chris Johnson was recognized as Refuge Officer of the year for Alaska. A new cabin was built a Pincher Creek. A large culvert was installed on Skilak Loop Road for better salmon passage. Oil field operators added several significantly more environmentally friendly facilities. We also held public meetings on the draft Environmental Impact Statement and Comprehensive Conservation Plan.

In September we held our annual open house and Fall Fun day with a scavenger hunt, slide shows, and four hikes of various lengths for all ages.

As fall deepened and winter approached most of us retreated inside for the annual round of proposal writing, budget planning, and taking some annual leave to visit friends and families in warmer places.

So that's our look back on the old year; what about the look ahead? A new Federal administration is com-

ing in, so leadership of the Department of the Interior and the U.S. Fish and Wildlife Service will no doubt undergo some changes. We hope to finish the comprehensive planning process in the coming year, and we will continue to work with our friends and partners to conserve the unique resources that make this a special place to live.

Doug Staller is the new deputy refuge manager at the Kenai National Wildlife Refuge. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Alaska still a frontier for entomology

by Matthew Bowser

A dust louse, Badonnelia Titei, was found beneath Matt Bowser's desk at the Kenai National Wildlife Refuge's headquarters.

Despite over 150 years of study of the Alaskan insect fauna, it is still quite easy to find species that were not previously known to occur in the state. This is true because we do not yet have a complete checklist of our arthropod fauna and because exotic species are frequently introduced.

The first scientific collections of insects from Alaska were made under Russian rule in the 1840s and 1850s. Fredrik Frankenhaeuser collected many species of beetles here on the Kenai Peninsula over this time period, which were sent back to Europe and described by Carl Gustav von Mannerheim.

No more significant entomological explorations in south-central Alaska were undertaken until the Harriman Alaska Expedition of 1899, when Trevor Kincaid collected insects and Arachnids from much of coastal Alaska including Seldovia and Homer.

Since then, numerous entomologists have visited the state and contributed greatly to our knowledge of the Alaskan fauna, but the vast majority of the specimens collected in Alaska have been sent to collections and experts outside of the state. In this way Alaska is similar to many developing countries in that most of the information on its fauna resides in scattered institutions outside of its borders.

Derek Sikes, curator of insects at the University of Alaska Museum in Fairbanks, has begun compiling a checklist of the terrestrial arthropods of Alaska by searching through collections, databases, and printed works for records of Alaskan species. Without such a checklist it is difficult to answer simple questions such as, "how many species of insects are present in Alaska?" or, "what proportion of our insect fauna is endemic to Alaska?"

I have been helping with this project over the last year, mostly by tracking down literature on the various arthropod groups. I also traveled to the Canadian National Collection of Arthropods in Ottawa, where I scoured the collection for additional species not previously recorded from Alaska.

The checklist now includes more than 6,500 species of arachnids, myriapods (centipedes and millipedes), and insects, more than ten times the number of terrestrial vertebrates known from the state. Even though the list is still far from complete, it presents a first look at Alaska's terrestrial arthropod fauna as a whole and is already quite useful.

It is still surprisingly easy to add species to the checklist. As part of our work inventorying the fauna of the Kenai National Wildlife Refuge, we have found twelve species that were not previously known from Alaska. Two of these species, a daddy long-legs and a kind of a planthopper, were new to science. Such additions are hardly exceptional, as Derek Sikes in Fairbanks and Dominique Collet in Sterling have also found multiple species not previously known from Alaska—some from their own back yards.

One of our additions was a minute insect that bumbled across the floor beneath my desk in the Refuge's headquarters building. I usually ignore such things, but I collected this one, eventually finding out that it was a kind of a dust louse (*Badonnelia titei*), the first record of this animal in the Western Hemisphere. We

had an infestation of these little insects in our laboratory's drains.

Another addition to the checklist came from my house in Soldotna, where a population of long-bodied cellar spiders is well-established in my garage and crawl space. Like *Badonnelia*, this is an introduced species that thrives in association with man. New exotic arthropods are discovered in our state each year, some of which have been quite successful in pristine habitat. These species pose real threats, potentially displacing native species or even altering the character of the landscape. Kenai Peninsula residents are all too keenly aware of how influential even a single insect species can be due to our experience with the native spruce bark beetle.

Answering the question of "what species are present in Alaska?" is a first step towards understanding and managing the arthropod fauna of this vast region. Once a more complete checklist exists, then generalizations can be made about patterns of introductions and patterns of endemism among the members of our insect fauna, which will be useful for dealing with the problem of introductions of exotic species and conservation of Alaska's biodiversity.

Matthew Bowser is a STEP (Student Temporary Employment Program) biological technician at the Kenai National Wildlife Refuge and a graduate student at the University of Alaska Fairbanks. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

New visitor services manager for Kenai National Wildlife Refuge

by Janet Schmidt

Braving the myriad of elements that a trip through Alaska in December could effortlessly throw our way, my husband, Keith and I stuffed our Subaru Outback with everything I could remotely perceive as necessity, and we made our way from our home of 20 years in Fallon, Nevada, to our new home on the Kenai Peninsula. As the newly appointed Visitor Services Manager for Kenai National Wildlife Refuge, I could hardly contain my excitement—actually, I don't think I even tried.

I was the Visitor Services Manager for Stillwater National Wildlife Refuge located in Fallon, 60 miles east of Reno, Nevada. It was there I cut my teeth with the National Wildlife Refuge System, learning and growing a substantial public use program from the ground up. Life in the high desert of the Great Basin was not without its wondrous, fulfilling adventures. An hour's drive to the mighty Sierra Nevadas, the state is (believe it or not), the most mountainous in the union—not the tallest or most beautiful mountains, mind you, (speaking as a new Alaskan I think we know which state would win that title) but Nevada enjoys the most mountain ranges of all 50 states. And, seemingly every Nevada house has a horse in the back, and ours was no exception—we have two. We would spend many a weekend camping and riding in the desert as well as the cooler mountain passes. The horses, however, have asked that they be allowed to remain in Nevada with our daughter, Sally, and our two grandsons, Josh and Ethan as they are not at all sure they would appreciate the trees and colder temperatures.

Long ago, I began my working career as a freelance photojournalist in Maine, where I lived for 32 years. For some inconceivable reason, I thought it would be a good idea to strike out and join the U.S. Navy to try and secure a seat in their highly acclaimed journalism school, but a slot in that school never opened up. Instead I became a Yeoman, which is administrative, but the position allowed me to serve as a collateral duty Public Affairs Officer at every station I served, while managing busy personnel offices for Naval F-18 squadrons. My first duty station was Fallon Naval Air Station, which boasts a rich and productive history, and is now the home of The Naval Strike & Air Warfare Center—alias, Top Gun. Fallon NAS is the last station pilots train before they are sent to the aircraft carriers, and one of the few places remaining where pilots can train with live ammunition. It was there I met and married Keith, who retired from the Navy after 22 years and now works at Stillwater Refuge as an Equipment Operator. We have 3 daughters, and the aforementioned 2 grandsons.

From Maine to Nevada with a short, two-year deviation to the Far East, stationed in Yokosuka, Japan, during the Gulf War, our little family is certainly well-traveled. After 6 ½ years in the Navy, however, I chose another path and received my B.S. in Resource Management from the University of Nevada, Reno. In 1995 I began volunteering for Stillwater Refuge, and after 1½ years they finally decided that they would just hire me, because they just couldn't seem to get rid of me. My tenure there ended at the end of November 2008 with my decision to again try something a little different. I'm lucky to have such a patient and willing family.

And, I'm fortunate to work in my chosen field as a member of the U.S. Fish & Wildlife Service. In my mind, it is truly one of the most diverse, challenging and satisfying jobs anyone could have. And, since my arrival to the great state of Alaska, I have found the Refuge and the area to be everything I expected and more. I am proud to join such a great team here at Kenai National Wildlife Refuge.

Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

109th annual Christmas Bird Count: Soldotna results

by Toby Burke

On Christmas Day in 1900, a small group of people inspired by ornithologist Frank Chapman started an alternative to the holiday tradition know as the Christmas "side hunt," where teams of hunters competed to see who could shoot the most birds and other wildlife in the course of the day. A viable conservation ethic was starting to gain traction around the beginning of the 20th century, and many conservationists were alarmed by North America's steeply declining bird populations.

Accordingly, Chapman initiated a different kind of hunt, a census, where people instead searched for, identified, counted, and recorded all the birds they saw, founding what is now considered to be the world's most significant citizen-science based conservation effort.

Today Chapman's Christmas Bird Census is universally known as the Christmas Bird Count (CBC) and is a venerable 109 year old institution. Annually the CBC has approximately 60,000 participants counting in over 2,000 count circles. They identify to species all birds they see or hear within a 15 mile diameter count circle, within a 24 hour period. A count can be conducted on any one day from December 14 through January 5.

The Soldotna CBC was started in 1983 with the count circle centered on the Kenai National Wildlife Refuge Headquarters on Ski Hill Road. The latest Soldotna CBC was held on December 27th, 2008.

Weather conditions varied widely within the count circle. Early morning temperatures dipped to -17° F at the Soldotna Airport while areas near Kenai experienced a late afternoon high of +20° F. Soldotna was calm while areas along the lower Kenai River had steady winds most of the day peaking at 20 mph. Lower portions of the Kenai River and Flats experienced heavy ice fog and the entire area had partly cloudy conditions.

Thirty participants, divided in to ten parties, braved the winter weather to identify, count, and record all the birds they could find within the Soldotna count circle. These intrepid souls spent a total of 30 party hours in the field, 4.25 hours on foot and 25.75 hours by car. During that time they covered 264.25 miles, 6.25 miles on foot and 258 miles by car. In addition to 30 field participants, 11 of which were youth, two feeder watchers expended a total of 10 hours of effort observing their yard and feeder birds.

Count Day marked the onset of 15 consecutive days of sub-zero weather. As with people, cold weather tends to cause birds to seek cover and minimize exposure. Despite a record number of participants generally low numbers of birds were observed, being scarce even at normally productive locales such as bird feeders and the open waters of the Kenai River.

A total of 1539 individual birds of 31 species were counted. The five most numerous species were Common Raven (380), Bald Eagle (279), Snow Bunting (200), White-winged Crossbill (101), and Common Redpoll (88). The majority of ravens and eagles were observed in and around the Soldotna Dump while all the Snow Buntings were observed in a single flock on the Kenai Flats. Both White-winged Crossbills and Common Redpolls are common across our forested landscape this winter but were definitely under-represented in this year's count.

The next five most common species were Black-billed Magpie (82), Black-capped Chickadee (82), Boreal Chickadee (57), Pine Grosbeak (40), and Bohemian Waxwing (31). Magpies are both ubiquitous and conspicuous residents of our increasingly urban landscape while both species of chickadees are common yard and feeder birds. Grosbeaks occasionally attend feeders but, like waxwings, are also observed in berry-laden trees.

Mew Gulls (25), Red-breasted Nuthatches (23), Glaucous-winged Gulls (22), Common Mergansers (17), and Rock Pigeons (12) were the next most common species. Both species of gulls were scarce do to the dearth of open water on the Kenai River as well as ducks of which, notably, only one species was observed this year.

Unusual observations included an adult Slaty-backed Gull at the Soldotna Dump. This Asiatic species has been recorded on the last four consecutive CBC's. Also, a Boreal Owl and two Northern Hawk Owls were recorded this year, each species for only the second time in the count's history. And finally, a small flock

of at least seven Horned Larks was observed, loosely associated with the flock of Snow Buntings, on the Kenai Flats. This is the first time this species has been recorded on the Soldotna CBC and only the second time it has ever been observed in winter on the Kenai Peninsula.

Thirty-one species were observed this year but a total of 60 species have now been recorded on the Soldotna CBC since its founding in 1983. Outstanding for a count situated largely in a boreal biome.

Soldotna CBC compiler Jack Sinclair acknowledged that while birds were harder to come by this year participants were not. He is greatly encouraged by the steadily increasing number of Soldotna CBC participants which has climbed from seven in 1999 to 30 in 2008. And considering that more than a third of those participants were youth, the future of the Soldotna CBC looks bright.

If you missed participating in the Soldotna CBC but still want to be involved in a citizen-science winter bird survey, consider participating in this year's Great Backyard Bird Count during President's Day weekend February 13-16. Visit www.birdcount.org for details.

Toby Burke is a refuge biological technician who is intrigued by the status and distribution of Alaska and Kenai Peninsula birds and enjoys birding with his wife and family. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Outdoor summer jobs available for college students

by Jetta Minerva

Fee rangers, one of the seasonal position the Refuge is hiring for, are shown here cleaning firepits at Hidden Lake Campground.

Do you know a college student who likes to work hard in the outdoors, doesn't mind getting their hands dirty, and is looking for work this summer? The Kenai National Wildlife Refuge has a few challenging, yet rewarding, job opportunities. These outdoor summer positions provide students with the experience of working for a large federal resource agency responsible for managing a two million acre national wildlife refuge.

The following STEP (Student Temporary Employment Program) requirements must be met to qualify for the positions: a valid driver's license, have housing in the community, have completed at least one year of college, be currently enrolled in at least six credits at an accredited college, and be returning to college in the fall, taking at least six credits.

Fee Ranger: three Positions for College Students. The Refuge will be hiring three fee rangers to handle fee collection and record keeping for Hidden Lake Campground and Upper Skilak Campground, both located within the Skilak Wildlife Recreation Area.

Fee rangers perform field patrols by vehicle and on foot to assess conditions of campgrounds and trails to assist visitors. Fee rangers handle housekeeping and maintenance duties for facilities, restrooms, grounds, and signs. They assist the campground hosts in campground operations and special projects. Fee rangers work independently and as part of a team.

Fee rangers will be trained in bear safety, First Aid & CPR, and Refuge policies, procedures, and regulations. Applicants should be prepared to work weekends with weekdays off. A typical workweek will have a combination of early and late shifts. Fee Ranger positions begin May 12 and last until August 15. Pay is $12.26 per hour.

Applications can be picked up the Kenai National Wildlife Refuge Visitor Center on Ski Hill Road, Soldotna. Application packages for Fee Ranger positions must be turned into Jetta Minerva, Park Ranger by February 20, 2009. Eligible applicants will interviewed by March 6th. After interviewing, final selections will be made by March 10th and selected applicants will be notified. Jetta Minerva can be contacted at 907-262-7021.

Trail Crew: The refuge will be hiring college students for the Kenai trail crew. The trail crew works to complete new construction and rehabilitation projects on refuge hiking trails, remote backcountry routes and wilderness canoe trails. Projects will include trail reroutes, construction of footbridges, boardwalks, and timber stairs, and installation of drainage and erosion control structures. Crew members will be trained to use a variety of hand and power tools including chain saws, to complete routine trail maintenance (clearing brush, trimming branches, removing downfall, etc.) and to construct new trails. Trail Crew positions begin on May 12th and may last until September 26th. Pay is $16.25 per hour.

Perhaps the most challenging, yet exciting aspect, of the trail crew job is the opportunity to participate in extended overnight stays in the field to complete projects in remote areas of the refuge. What these "spike camps" lack in creature comforts is offset by the unique and memorable wilderness experiences they offer. The work is physically demanding and the working conditions are not always ideal, but the crew members will enjoy some of the most beautiful scenery the Kenai Refuge has to offer.

Application packages for the trail crew must be turned into Scott Slavik, Backcountry Park Ranger, at Kenai National Wildlife Refuge Visitor Center on Ski Hill Road in Soldotna by March 13, 2009.

Eligible applicants will interviewed by March 16th. After interviewing, final selections will be made by March 18th and selected applicants will be notified. Scott Slavik can be contacted at 907-260-6163.

Jetta Minerva is a Park Ranger for the Kenai National Wildlife Refuge. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Get out and ski!

by Mark Laker

Ok, almost to the top now. It's 5° out, but I'm getting warm and a little winded. I'm on the Centennial Ski Trail at the Kenai National Wildlife Refuge headquarters on Ski Hill Road in Soldotna. The Centennial trail was completed in 2004, in recognition of the National Wildlife Refuge system's centennial. It's the weekend and I'm out with my wife and our two year old son getting a little fresh air. My son is cheering me on, "Faster daddy faster!" from his sled—which I'm pulling.

His sled is actually called a ski pulk. It has stiff poles that are attached to a waist belt, and the sled has a little seat with buckles—a good feature for hauling two year olds. My ski tips are spread wide and my knees are turned in making a "V" and giving me traction. This technique is called the Herringbone because of the pattern it creates in the snow as you go up the hill.

Ok we made it; I'm actually hot and starting to sweat. I'm looking forward to the cold air in my face as we go down the hill. We are off! I start to hear giggles and "Wee! faster faster!" behind me and I feel that exhilaration of speed under my feet. The air feels very good; it is a long hill. When we finally stop, I ask my son, "Now was that fun or what?" He says "Yes daddy, let's do it again." Cross country skiing is one of my favorite winter activities. I especially like going in February and March as the days are longer, warmer and the snow is usually better. We have great Nordic skiing opportunities here in Soldotna and on the Refuge.

It may surprise you to hear we have 12 miles of ski trails at the refuge headquarters. There are six groomed loops: Centennial (2.8 miles), Cheehchako (0.9 miles), Howling Hill (2.3 miles), Nordic View (3.5 miles), Raven Ridge (4.6 miles), and a loop around Headquarters Lake (2.2 miles). The trails offer a good range of difficulty. Cheechako is a beginner loop with a few small hills. If you want really flat, try Headquarters Lake. The lake is a favorite for skate skiing.

There are some great trails off the Refuge too. The Tsalteshi ski trails at Skyview High School offer 15 kilometers of groomed trails, and some are even lighted (www.tsalteshi.org).

Looking to trim down or make some of those New Year resolutions? Working both the upper and lower body simultaneously, cross country skiing is the total body workout. Every major muscle group is being used to propel you along or maintain balance. With all those muscles working, a lot of calories get burned. In fact no other sport or activity burns as many calories (up to 1100 calories/hour). At a brisk recreational level you can burn about 700 calories/hour (http://caloriecount.about.com).

This is just what I need after a holiday full of meatballs, potatoes, pie, and ice cream. Beside burning calories, you will be burning off stress, feeling better and maybe getting smarter. Exercise stimulates the brain to release chemicals that promote the growth, strength and health of brain neurons. There is growing research linking academic achievement and exercise. Exercise itself won't make you smarter, but it appears to help you learn.

Mostly I like skiing because it's fun and offers a little adventure. My days as a field biologist spending four months a year in a little tent are just a memory—that's not all bad. Though odd things do occur at the office, I miss the daily opportunity to see or discover something new and fascinating.

Our public recreational cabins are another great skiing destination. You can rent cabins nightly for $35 to $45. Several cabins are just an easy ski across a lake. The ice is usually plenty safe this time of year, but you can call and ask our visitor services staff for an update.

My most memorable ski experiences are from clear, cold, full moon nights when the crystals of hoar frost become illuminated. The adventure of a ski trek in to a cabin, and the solitude of a quiet starry sky, will create fond memories for years to come. So get out and ski!

Mark Laker has been the ecologist at the Kenai National Wildlife Refuge since 2003. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Tales of a budding birder

by Todd Eskelin

As our children grow up and head off to college, they are often seeking advice on what direction in life they should go with their schooling and careers. We are routinely asked by younger folks when we knew what profession we were going to choose. The kids are always worried that along the way they may miss their true calling. So we are asked to look back and think about when we knew we were going to be a pipefitter, an engineer, a plumber, or biologist. For most of us there is no clear cut answer about who influenced us or when that calling came.

For me, I can remember both the person and the time when my true calling arrived. It was the summer of 1978 and I was your typical 9-year-old growing up on the Kenai Peninsula. School was out and I was trying to find something to do besides the chores I was responsible for. I don't remember the exact date, but it was early summer. When I was told to go take the trash out to the garage, I noticed a large sheet covering something in the garage. I quietly peeked under the sheet when nobody was looking and discovered my Grandma Rohrbeck was hiding under the sheet. After my breath returned to my body, I was informed that Grandma had flown up from Washington, and that she and I were embarking on one of our adventures the following day.

This was no ordinary adventure. We left the next morning for Anchorage. From there we caught the train to Denali National Park. Grandma Rohrbeck was notorious for her adventures. Her appreciation for natural beauty took her to the far stretches of the world, photographing the beautiful places and things that she saw. On this trip we were exploring the natural beauty of Denali N.P. that is an icon of what is everything Alaskan. We did all of the events that the park has to offer including hikes, dog sled rides, and sleeping in the old train bunks that had us stacked like cord wood with curtains separating all the patrons. All of these activities were eventful, but it was the bus ride to Eielson Visitor Center that was the memory that would eventually shape my career in natural sciences.

At the visitor center I loved watching the caribou, but it was a brood of Willow Ptarmigan with which I was most enamored. I followed them and listened to their little clucks and peeps as they informed each other about my direction of pursuit. Then, there it was on the trail; the most beautiful grasshopper I had ever seen. As I tried to grab it for a closer look, more appeared. By the thousands I was flushing them off of the trail in front of me. I went back to Grandma and got a raisin box so I could take some home with me. That is what 9-year-old boys have to do. Grandma encouraged me to leave them for everyone else to enjoy, but you know how far that argument went. I was determined. After successfully collecting a handful of hoppers and storing them alive in my little raisin box, we were forced to get back on the bus. I was so happy I had souvenirs to take home back to Soldotna.

Along the bumpy road back to Park Headquarters my raisin box fell on the floor. I climbed down to retrieve it, only to discover that it had opened and my new friends had escaped. I looked back under the seat and saw none of them. I looked forward and on the back of an elderly woman's leg were two of my six colorful grasshoppers. I would love to tell you the tale ended with the grasshoppers continuing to climb, but it didn't. When my grandma saw me sitting there with the empty box, she was mortified. I was returned to my seat and did not move until the bus reached our home base.

I forever remember that trip and can honestly say that was the beginning of my fascination with science and the natural world. The point of the story is that you never know what adventure you expose your kids to that will give them a path to follow. There are opportunities out there that may just be the piece of the puzzle their little forming brains need to pick a path and travel down it for a while.

Today marks the beginning of the 12th annual Great Backyard Bird Count. This program started by the National Audubon Society and Cornell Lab of Ornithology is free and easy. You simply take a little time and count all the birds that come into your yard. This may be an hour, it may be all day, it is up to you. Or if your neighbor has a bird feeder, take the kids over and help them count and identify the birds at the neighbor's house. It is super easy to go online and enter all of your info; you can find everything you need at

the webpage: www.birdcount.org. Who knows, this may be the adventure that your kids remember for a lifetime.

Todd Eskelin is a Biological Technician at the Kenai National Wildlife Refuge. He specializes in birds and has conducted research on songbirds in many areas of the state. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Rediscovering the cross country ski & snowshoeing trails of Kenai National Wildlife Refuge

by Scott Slavik

Despite being in existence for over 40 years, the cross country ski trails adjacent to Kenai National Wildlife Refuge Headquarters and Visitor Center may be Soldotna's best kept secret. Within minutes of leaving "downtown," skiers and snowshoers can be transported into the frozen stillness, tranquil beauty and muffled silence of the Alaskan outdoors while a enjoying a traditional winter backcountry experience.

The Refuge manages the trails to offer users more of a backcountry skiing and snowshoeing experience. For the majority of our regular users, exercise and fitness are secondary to the opportunities to observe wildlife and to "just enjoy being outside." Beautiful scenery, solitude, peace and quiet seem to be more sought after rather than the burning of calories.

With nearly 10 miles of ski trails, skiers and snowshoers of all abilities can find a route appropriate for their skill level. Beginners can hone their skills on a 2.8 mile loop around Headquarters Lake while enjoying inspiring glimpses of the Kenai Mountains. This route is groomed wide enough to accommodate skate skiers as well as snowshoers. Even when trail conditions deteriorate, this route generally remains in fair condition.

After mastering the Headquarters Lake Loop you may be ready for the Cheechako Loop (.9 miles). This route, designed with beginners in mind, is relatively flat with a couple small hills to offer a modest challenge, increase your skills and boost your confidence.

The Howling Hill Loop (2.3 miles) is rated as Intermediate, perhaps more due to the length rather than the terrain. This route begins with a straight and level trek through wetlands and a black spruce forest. You are teased with a peek at Nordic Lake before turning and heading back to the trail head.

The Nordic View Loop (3.5 miles) parallels Nordic Lake and offers the intermediate skier some terrain challenges. Be prepared to climb a few short steep hills, but know your effort will be rewarded with long satisfying downhill glides.

For hearty skiers craving a longer adventure, the 4.6-mile Raven Ridge Loop offers hills and turns to test your abilities and long upland straight-aways to really "stretch out" your kicks and glides. This route gets its name for the large numbers of ravens commonly seen in the area. I recommend bringing a camera on your next trip for some good photo opportunities.

My personal favorite, the Centennial Trail (2.8 miles) offers the greatest variety of habitats, scenic views and skiable terrain. Snowshoers and experienced skiers will enjoy lake views, majestic stands of hardwoods, wildlife viewing opportunities and long downhill runs.

Even though these trails are relatively short, users should plan for their day and always keep safety in mind. It is recommended that you first check with the Visitor Center for current trail conditions and help yourself to a ski trail map. Also, inspect your equipment before heading out on the trail, use trails equal to your ability, follow directional signage and dress warmly in layers. Bringing a few snacks, some water and a buddy is always a good idea when venturing out on the trail.

Regardless if your intentions are to strengthen quads and hamstrings or to enliven the spirit, you're invited to come enjoy longer days and blue skies while rediscovering the cross country ski trails at Kenai NWR.

Scott Slavik is a Backcountry Ranger on the Kenai National Wildlife Refuge. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Refuge ecologist visits Borneo, marvels at giant trees in a rapidly vanishing rainforest

by Ed Berg

The author climbing a Koompasia tree in Borneo, using Jumar ascenders on a rope. The first branch was 160 feet above the ground. The tree was about 260 feet tall; it is in the pea family. The surrounding area was selectively logged 10-20 years ago for even larger trees. Photo Credit: Stephanie Moore

My travels this winter took me to Borneo, a huge island in Southeast Asia halfway between Vietnam and Australia. I traveled with Roman Dial and his tropical ecology class from Alaska Pacific University.

The northern third of Borneo is part of Malaysia; we traveled mostly in the Malaysian state of Sabah, the least developed part of Borneo. The southern two-thirds of Borneo is part of Indonesia. A tiny sultanate called Brunei is perched on the north coast of Borneo; it has little land but most of the crude oil, natural gas and money.

Much of Borneo has been logged in the last several decades, and replanted with oil palm plantations, especially in the Indonesian part. Oil palms have created an economic boom with people now driving cars who were on motorbikes 15 years ago. Palm oil is widely used in paints, cosmetics, cooking oil, and even as biodiesel fuel. Colgate-Palmolive soap, introduced in 1898, was one of the first big users of palm oil, along with olive oil.

The seed-to-seed time for an oil palm tree is just 30 months, and investors expect to recover their initial capital in five years, a 15% annual return. Oil palm productivity starts to decline after a dozen years and the trees become too tall to harvest efficiently, so plantations must be replanted every 25 years. I asked various people how many cycles of replanting could be done before the soil nutrients were depleted, but no one seemed to know; they're still on the first or second cycle. Once the nutrients are gone, heavy doses of petroleum-dependent fertilizer will be needed, and the "gold" may disappear from the "green gold" of palm oil.

Landowners large and small have made a lot of money from oil palms, but the market price of palm oil is presently down and this will provide less incentive to cut down virgin rainforest to plant oil palms, at least for the moment.

Since the 1970s Borneo has been a logger's paradise. I have never seen such huge and perfectly formed trees. Trees grow rapidly in this warm, "everwet" climate. Many are dipterocarps, a family of trees mostly native to the Old World tropics of Southeast Asia. They typically grow very straight and self-prune their lower branches; they have a cabbage-like top which towers above the surrounding canopy of smaller trees.

The relatively open character of the high canopy in the Old World tropics appears to have favored the evolution of a variety of gliding animals, such as flying squirrels, flying geckos, flying frogs, and flying colugos (a possum-sized arboreal mammal). There is even a "flying" snake with hinged ribs which can flatten it-

self out enough to have a bit of an airfoil; it can stall its gliding flight just in time to land vertically on a tree. The New World tropics have much smaller trees with an overall flatter canopy, and haven't developed these kinds of gliding animals.

The lack of lower branches makes these trees excellent for knot-free plywood. Indeed, we were told that much of Borneo's tropical rainforest has been logged to provide plywood for concrete forms for Japan; the forms are used twice and then discarded. I recently bought some 3/8-inch AC plywood at a local lumberyard; the A-side was a uniform knot-free surface that showed no tree-ring swirls, unlike typical fir plywood. Tropical trees have no tree-rings, e.g., balsa and mahogany, due to the lack of seasonality, and I wondered if this plywood came from Borneo.

We visited Tawau Hills Park, a fertile volcanic area with the world's tallest tropical tree (88.32 meters, 290 feet), which Roman Dial and some Australian friends found and climbed a few years ago and measured with a long tape measure. In this park Roman and friends have found seven species of trees more than 80 meters (262 feet) tall, four belonging to the dipterocarp genus Shorea (which has 196 species). The timber volumes in these huge trees can be up to 250 cubic meters (106,000 board feet); this is enough wood to build more than six 2000-square foot houses from a single tree.

For nature lovers any visit to the tropics is a celebration of biodiversity. The famous naturalist and ant specialist E.O. Wilson coined the phrase "biophilia" to describe the affinity of human beings for other life forms, our love for "all creatures great and small," as James Herriot expressed it. In the tropics there are interesting creatures everywhere you look, if you take the time to walk slowly and look carefully. We saw walking sticks 8 inches long, moths with 10-inch wingspreads and fruit bats with 3-foot wingspreads, 3-inch beetles, monkeys, gibbons, orangutans, and dozens of species of colorful birds.

In southcentral Alaska we have a dozen or so species of trees: 4 species of spruce, 2 cottonwoods, 2 hemlocks, birch, aspen, alder, and a bunch of willows– a few of which can grow to tree size if the moose don't get them. You might get a half dozen of these trees growing on the same acre or same hectare (2.5 acres). Neotropical rainforests average 200 tree species per hectare; SE Asia averages 150, Africa averages 100. The single richest hectare yet measured is in Amazonian Ecuador with 942 species of vascular plants, half of which are trees. The tropical areas of the world have had relatively stable climates for millions of years, and they have had time for species to diversify and become finely tuned to specialized food sources and habitat niches.

There are some striking difference between the Old World tropics like Borneo and the New World tropics. I have traveled extensively in the New World forests of Central America; in Borneo I missed seeing some old friends like hummingbirds darting from flower to flower, bromeliad epiphytes heavily encrusting tree branches, and a general profusion of colorful flowers so abundant in countries like Costa Rica, Belize, and Panama. The dipterocarp forests of SE Asia are more lean, or more precisely, they have a "boom and bust" natural economy that is based on the phenomenon of mast fruiting of the dipterocarp trees. These trees only flower (and produce fruit) every 2-7 years, catalyzed by dry periods that track the El Nino cycle.

The dipterocarps produce winged fruit from the size of a pea up to the size of a walnut, depending on the species. During a mast year over a hundred species of trees all fruit in synchrony, and all the fruit-eating creatures celebrate and gorge themselves. Even with such intense fruit consumption, enough fruit is left to provide seeds for new trees and forest regeneration. (Alaskans may recognize this in the masting of spruce trees—the years when most trees are loaded with cones.) In non-mast years in Borneo, like this one, bird and animal populations shrink, and there is less visible activity in the forest.

In my next article I'll describe our visit to Gomantong Cave to see the birds whose nests are used for highly prized Chinese bird's nest soup, as well as our hard-won ascent of Mt. Kinabalu, the highest mountain in Borneo at 13,435 feet.

There is an excellent article on Borneo in the November 2008 National Geographic magazine, which is available at: http://ngm.nationalgeographic.com/2008/11/borneo/white-text.html.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. He will be teaching his 5-week Global Climate Change course at the Kenai Peninsula College starting March 24 in Soldotna and March 26 in Homer. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Adapting to climate change: Why bother?

by John Morton

After an unusually cold winter on the Kenai with a long period of -30° F weather over the holidays, it's sometimes hard to believe that global climate change is real.

But, outside of the high arctic, the Kenai Peninsula may have the best documented impacts of climate change in Alaska. Over the last 50 years, the Harding Icefield has receded 5% in surface area and 21 meters (70 feet) in elevation while treeline in the Kenai Mountains has risen 50 meters (165 feet). Closed-basin lakes in the Kenai Lowlands have been drying, and shrubs and black spruce have encroached into peatlands that haven't changed in 8,000 years. Warmer summers have sustained a spruce bark beetle outbreak that killed over a million acres of white, Lutz, and Sitka spruce on the Peninsula. And wildfires are burning earlier (in April!) in bluejoint grass that has replaced trees in beetle-killed spruce forests. Fires are burning in unusual forest types like mountain hemlock, and they are ignited by more lightning strikes than in the past (1,000 strikes caused 22 fires in 2005!).

What about our fish and wildlife? Northern sawwhet owls and western screech owls have clearly shifted their ranges northward along the Alaska coastline in the last two decades. Northwest crows and Steller's jays are much more common on the western side of the Peninsula than they were in the recent past. The timing of bird migration is changing—new records of early arrivals or late departures for over 20 bird species were documented on the Kenai in 2008.

The loss of about 200 caribou (20% of the Peninsula-wide population!) to three avalanches in recent years may be due to changing snow conditions in the Kenai Mountains. A 40% loss in the average weight of sockeye salmon fry in Skilak Lake has been attributed to declining plankton abundance due to increased glacial meltwater with high silt loads. On the other hand, American marten appear to be increasing in the Kenai Lowlands, in part, due to warmer winters with more snow.

So for better or worse, many plants and animals are adjusting to accelerated climate change. Does this mean that life will go on, but just a little bit differently? Not really, if predictions by some biologists become true. First of all, some species are likely to go extinct. One study suggests that 13-37% of species worldwide will be on a trajectory for extinction by 2050. Polar bears likely fall into that category. Another study that examined the distributions of nearly 3,000 animal species in the Western Hemisphere suggests that some areas, such as arctic tundra, are likely to have 90% of the species in any given 50 x 50 km cell (an area about the size of Game Management Unit 15A) be different by the end of this century. In other words, faunal distributions in the future will bear little resemblance to those of today.

Perhaps one of the biggest changes will be the formation of novel species assemblages or communities. Each species responds to a changing climate differently due to its physiology, life-history, and ability to disperse and colonize new areas. Insects, for example, respond immediately to subtle changes in climate because their metabolism is dependent on air temperatures. However, the vegetation they rely on for food or egg laying may be unavailable because soil nutrients or a seed source may be preventing these plants from getting established. Dr. Glenn Juday at the University of Alaska Fairbanks has pointed out, for example, that climate has already changed so much that treeline in Alaska mountains should already be much higher than it currently is except that high-elevation soil often isn't available for germination.

This disconnect between what a species needs and its response to climate change can lead to a bad situation. Ecologists use terms like "trophic mismatch" to described situations where existing predator-prey and parasite-host relationships break down. When this occurs, species may be locally extirpated and, if the mismatch occurs across its entire range, it may lead to extinction.

Within professional wildlife management circles, we've begun to talk about helping species adapt to climate change. We can be reactive, in which case we try to maintain historic conditions by reducing the impacts of a rapidly changing climate. Or we can be anticipatory in our responses, in which case we try to help a species adapt to new conditions in a new climate. On the Kenai, for example, as our wetlands and

closed-basin lakes disappear in response to a warmer and drier climate, we could offset that loss to breeding waterfowl by creating managed impoundments or eliminating beaver harvest so that more ponds are created. These would be reactive responses.

Alternatively, the Kenai is moving towards more hardwood-dominated forests, and grassy savannahs in logged areas. We expect more frequent and rapidly spreading wildfires because conditions are drier. Furthermore, more continuous forest cover is being created as trees and shrubs spread into drying wetlands that once served as natural firebreaks. Perhaps, in anticipation of future habitats, we should deliberately manage towards those new habitats by not suppressing wildfires, and by using prescribed burns along the urban interface to reduce fuel loads and protect houses. These would be anticipatory responses.

In reality, we will likely use both approaches in the coming decades to respond to climate change. Accelerated climate change is not occurring uniformly across Alaska. It will be important for us to identify "refugia", areas in Alaska that are not expected to change much in coming decades. These areas will need to be conserved to ensure that existing species assemblages have a place to live and can serve as a Noah's ark to help populate areas that are rapidly undergoing change elsewhere in Alaska. Areas that are expected to be extremely dynamic in their response to climate change should be encouraged to change, sometimes through active habitat management and sometimes by employing assisted migration, a new approach to help species move across the changing landscape by translocating them and/or ensuring movement corridors.

There is an alternative to the actions proposed above. That's to do nothing. The natural world around us will change, whether we help it or not. However, if we choose the latter, it could be a world with sadly diminished beauty and less variety than we know today.

John Morton is the Supervisory Fish & Wildlife Biologist at the Kenai National Wildlife Refuge. He is also adjunct faculty at the University of Alaska Fairbanks and Colorado State University. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

More scenes from Borneo—a bird's nest soup cave, leeches and pitcher plants, ascent of Mount Kinabalu

by Ed Berg

The insectivorous pitcher plant Nepenthes rajah grows only on the slopes of Mt Kinabalu and neighboring Mt Tambuyukon in Borneo. The fluid-filled pitcher has a dark red collar around the throat. A lid arches forward over the throat of the pitcher as an awning to keep out rain. A steep pencil-thin tendril comes off the tip of a leaf above (out of sight) and attaches to the base of the pitcher. The pitcher rests on the ground and is about 8 inches high. Insects are attracted into the pitcher, captured in the sticky fluid, and digested by enzymes. Photo Credit: Kimberly Holmes

I have seen "bird's nest soup" on menus in Chinese restaurants, but I always thought this was some kind of euphemism like "sweet breads" or "mountain oysters" for something totally different from what the name literally describes. I couldn't imagine actually making soup out of bird's nests. But, no, I was wrong; bird's nest soup is the real McCoy.

On my recent trip to Borneo (Peninsula Clarion, Feb 27), I had occasion to visit Gomantong Cave where bird nests have been collected since the 1600s and sold to Chinese traders. Two species of swiftlets inhabit the caves; the white-nest swiftlet and the black-nest swiftlet. Swiftlet nests are held together with ribbons of sticky saliva; the highly prized white nests are almost entirely saliva, which dries to a translucent white color. The black nests have feathers cemented together with saliva, and fetch a lower price because the feathers must be removed before the soup is prepared.

Bird's nest soup, we were told, is favored by middle-aged Chinese ladies to prevent wrinkles. Like ginseng, it is thought to generally improve libido and overall health. Whatever its virtues, real or imagined, it is a very popular food item on international markets; white bird's nests can bring as much as$4000 per kilogram.

Collecting bird nests in Gomantong Cave is a highly dangerous but lucrative activity, and is definitely off the scale of dirtiest jobs. We followed a narrow boardwalk laid down on top up several meters of soft, smelly guano, staring in amazement at the vaulted ceiling 90 meters high. The bird nest collectors, called "spidermen," use narrow, handmade rope ladders suspended from hooks to access the upper reaches of the ceiling. Just how the original hooks got up there was not at all obvious. The bird nests are small cups glued directly onto the rock; they must be cut off with a knife on a long bamboo pole, and caught by waiting workers below. The nests are harvested twice a year; the first time before eggs can be laid, and the second time after the swiftlets have rebuilt a new nest and fledged their chicks.

The cave has its own finely tuned ecosystem. A million swiftlets fly out of the cave in daylight hours to forage for insects in the surrounding forest, and approximately two million bats of 27 species fly out at night for similar purposes. The digested insects are deposited as nitrogen-rich guano, which feeds an army of millions of dung-beetles and cockroaches. The cockroaches are not our standard black model, but are orange with black bands and actually quite handsome, as cockroaches go.

A visit to Borneo is not complete without some leech encounters. Borneo leeches are terrestrial, not aquatic like Alaska fresh-water leeches. They typically hang out on the bushes awaiting a passing meal, such as myself. There are several species, including the striped tiger leech which is several inches long, depending on how far you stretch it out. These leeches can move rather quickly, using an end-over-end loop-

ing movement with their suction cups on both ends. They are heat seeking, and supposedly will looptyloop over to you, if you stand in one place too long. In the forest I always wore two pair of fine-mesh women's nylon hose, with my long pants tucked into the outer hose. This was fine for the legs, but several leeches did get in through my shirt openings. Fortunately, they detach fairly easily and don't usually carry diseases. The bites don't hurt because they anesthetize the wound, but the blood will continue to ooze because they inject an anticoagulant. One can complain about the aesthetics of Borneo leeches, but personally I would take them any day over the lyme-disease carrying ticks of the eastern U.S., which can be hard to find and harder yet to completely remove.

The toughest part of our trip was a two-day climb up Mt Kinabalu, the highest point in Borneo (and Malaysia) at 13,435 feet. The vegetation is stratified in several distinct zones on the mountain, and botanists from all over the world have studied the unique plants, many of which are endemics found only on Mt Kinabalu. There were for example 12 species of carnivorous pitcher plants, three endemic to Mt Kinabalu. Pitcher plants have a bulb-shaped pitcher filled with a sticky fluid of sweet-smelling, digestive enzymes. Insects and small animals are attracted into the pitcher, fall into the fluid and are digested for their nitrogen compounds. Pitcher plants thrive on nutrient-poor soils (serpentine, in this case), because they don't depend on normal soil-based nitrogen. In most species a small lid hovers above the mouth of the pitcher to keep out rainwater, which would dilute the digestive fluid. Our guide told us that he put a dead frog into a pitcher and it took a week to digest. The largest pitchers can hold up to 3.5 liters of fluid, but most would hold only several ounces.

The worldwide distribution of pitcher plants is quite spotty. I have seen them in Georgia and in Venezuela, and nowhere in between. In the New World pitcher plants, an entire leaf has been modified to make the pitcher; in the Old World pitcher plants of Southeast Asia a tendril running off the end of a normal leaf has been modified to form the pitcher (see photo).

Mt Kinabalu is a treasure trove of orchids, with more than 1000 species, as well as shrubs like rhododendrons (29 species, 9 endemic), and trees like oaks, chestnuts and podocarps, and two species of the world's largest flower Rafflesia, whose 5-petaled flowers measure 12 inches across. Rafflesias are parasitic plants on the roots and stems of vines; they attract insect pollinators with an odor of rotting flesh that gives them the local name of "corpse flowers."

The climb up Mt Kinabalu was not for the faint of heart or weak knees. We started from our guest house at 7000 feet, and climbed up a steep rocky trail to a hostel at 11,000 feet, where we recouped, had a good meal and a short night's rest. At 3 am we arose and started up the trail by headlamp in order to get to the summit by dawn. The trail was crowded with more than 100 other pilgrims, each taking one step at a time to conserve their ever-shrinking breadth. A one-inch rope was strung over this part of the trail, which provided a useful handhold for pulling ourselves up the steeper parts, as well as ensuring that we didn't veer off the trail into a dark abyss. Rickety wooden steps, widely-spaced, and handrails helped us over some of the steepest, most eroded parts of the trail. When dawn began to provide more light, I could see that we had climbed up onto a bare granite plateau, scraped clean by glaciers during the last ice age. The final summit (Low's peak) was another few hundred meters above the plateau. The air was pretty thin at this point and my stomach was not feeling too good, experiencing the first stages of altitude sickness. Nevertheless, we plodded on, one step at a time, summoned by twinkling headlamps of hardier souls who had already reached the summit. The view of sunrise from the top of the world was indeed spectacular, and I was glad that I had continued to put one foot in front of the other to make it to the top. We could see the South China Sea to the northwest, and our highway route from Kota Kinabalu, the capital of the Malaysian state of Sabah on the coast. Low's Gully dropped off 1800 meters on the north side, not a good place to drop your wallet.

The ascent of Mt Kinabalu was one of our last adventures on this trip, and within a few days we were on the plane returning to Anchorage, wondering if Mt Redoubt would hold off long enough for us to land. Borneo is a spectacular place to visit. As my professors told me years ago, you should see the tropical rainforests of the world while they are still there to be seen. Borneo is developing rapidly with logging and palm oil plantations, but much of it is still a sparkling jewel box full of the diversity of life.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. He accompanied Alaska Pacific University Professor Roman Dial and his tropical ecology students to Borneo for a month in January.

Ed will be teaching his 5-week Global Climate Change course at the Kenai Peninsula College starting March 24 in Soldotna and March 26 in Homer. Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Journey down the tag

by Jetta Minerva

The author dons her rain gear for another day of vegetation surveying on the Tagagwik River in the Selawik National Wildlife Refuge. Photo Credit: Michelle Prehoda

I started working for the U.S. Fish & Wildlife Service as a biological technician after my sophomore year in college while attending the University of Alaska Fairbanks. I could write an entire novel about the experiences I had as a biotech, but the most memorable experience happened during the summer of 2003 when I was stationed in the village of Kotzebue working for the Selawik National Wildlife Refuge. There I was assigned to assist a Graduate student named Michelle Prehoda from the University of Michigan. Michelle was doing an intensive study on moose browse (what moose were eating) at various locations on the Refuge. Our first study involved a 10-day float down the Tagagwik (Tag) River conducting vegetation assessments at 1 (river) mile intervals.

We flew on a charter to a narrow pond that ran parallel to the river. The plane had to make several trips to transport the 700+ lbs. of gear we needed to conduct the study. I went on the first trip and began portaging our gear while the pilot went back for Michelle and the second load. With a shotgun loaded with 3" slugs strapped across my back, I began transporting food, camping gear, and equipment to the riverbank. Michelle arrived and we heaved the rest of the gear and the motor-less raft to the bank of the river and began assembling it. It took several hours and lots of jumping up and down to get the floor boards in. From there we ferried our gear to the other side of the river and set up camp.

It was a beautiful summer day without a cloud in the sky and the mini temperature gauge on my zipper pull read 80° F. A nap was in short order and, using our life jackets, I made myself a cozy little spot on the gravel beach while Michelle curled up on one of the tubes on the raft. I awoke with beads of sweat trickling into my ears and vivid memories of a grizzly sniffing my legs. I had covered my face with my raincoat to block the midday sun and now found myself trembling with fear, aware of every hair on the back of my neck sticking straight out, afraid of what I would see. After what seemed like hours, I slowly peeked over the edge of my raincoat to find nothing amiss. Sighing with relief, I awoke Michelle and told her that I had just had a "dream" that a grizzly bear was sniffing my legs. With wide eyes she began telling me she had a similar "dream" in which a large bear was sniffing her back. We began investigating the area.

It did not take Sherlock Holmes to tell us not only where this grizzly had been, but also how large he was. His tracks came from upriver, right along the edge of the water in the sand. I was wearing hip boots and put both of my feet in one of the tracks and they did not fill the width of his foot. I immediately looked up at Michelle and I'm sure her expression matched mine; an expression similar to one who has nearly missed death. That was not the first time I've seen that expression, nor the last.

The tracks left the sand and onto the gravel in a direction that lead straight to my life jacket bed. Gasping, our eyes followed the tracks as they crossed back

over the sand right next to the raft where Michelle had been napping. The tracks then went to the cooler where water was leaking out of holes made by what appeared to be large teeth marks. The tracks then followed the narrow strip of sand all the way down the beach and on around the bend. After taking out and loading the second shotgun, we prepared dinner and reviewed our course on the map and GPS.

We awoke the next morning after a night of fitful sleep and realized the river was much higher after last night's rain. We were walking toward our gear when we both realized something was missing. The raft! We had pulled it up at least 15 feet out of the water, but that was not enough. It was gone, and it could only be one place: down river. But how far? Everything was in the raft: our radio, satellite phone, water purifier, even my shoes for goodness sakes! I grabbed a shotgun and took off running with Michelle following suit. We found the raft stuck in an eddy on the other side of the river. Without thinking I jumped in to go after it. After nearly drowning I scrambled up the bank and lay on my stomach gasping for air. It felt like I had been to a non-licensed acupuncturist with no patience. Michelle came on the scene and started laughing at me. I couldn't help but join in. How silly! If my dad was there, he would have thumped me on the head for not using it.

After acclimating ourselves to the water, we swam across and retrieved the raft. Nearly 2 hours later we radioed base for our daily welfare check. Michelle got on the radio: "Selawik Base, this is unit 22, over." "This is Base, go ahead 22" was the response. "Myself and 23 are just checking in; everything's fine and we're heading down river." "10-4, Base copies. We'll be waiting for your next welfare check tomorrow morning at 10 am, over." We were not about to reveal the mishaps that had already occurred on day 1 of our study. We were afraid they would send us back to the office and we hadn't even begun! Now we were ready; two women in the open country; not a boat or plane could be seen or heard. We were in wild Alaska and our journey had just begun!

We reached our first study site after 1 river mile. Using a compass we followed an imaginary line directly perpendicular to the river into the woods, stopping every 50 feet. There we established 15 meter plots and inventoried all the plants within that plot and estimated their abundance. We kept doing these plots every 50 feet until we passed the riparian zone into tundra (riparian refers to the plant communities along a river or stream). Some of the plots were extremely thick with alder and willow, making it difficult to keep a straight line. We did transects on both sides of the river. Sometimes it would take hours to reach the tundra.

When we came across plants that had been browsed by moose, we identified them, estimated abundance and percentage of browse, measured the width of the plant, and took leaf samples. Since there are over 40 species of willow in Alaska, identifying them could be difficult. Samples were important so that we could correctly identify them back at the office using microscopes. Samples of hybrid species were sent to a lab in Washington for identification. We did hundreds of plots on that trip. We hiked through rain and shine, clouds of mosquitoes, and piles of steaming bear scat, all in the name of science. We were constantly rewarded with sightings of hawks, owls, falcons, jaegers, black bears, not to mention waterfowl and songbirds. Grayling and pike adorned our mess kits, and ice from permafrost in the banks replenished our cooler.

That summer, we owned the Tag River. It was ours to explore, to learn from, and enjoy. I hope to go back to that wild and scenic river someday. Perhaps take my nephew; to watch his face light up with the sighting of a sharp-shinned hawk or peregrine falcon. To ask what kind of bird is singing, or what kind of fish are swimming under the boat. I realize now the importance of our National Wildlife Refuges; to experience the great outdoors and share them.

Jetta Minerva has been a Park Ranger at the Kenai National Wildlife Refuge since 2006. She worked previously at Yukon Flats National Wildlife Refuge as a manager trainee after graduating from the University of Alaska – Fairbanks in biology. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Refuge education specialist honored with Sense of Wonder Award

by Candace Ward

Michelle Ostrowski

Kenai Refuge environmental educator Michelle Ostrowski was honored this week as the Alaska winner of the Sense of Wonder Award sponsored by the U. S. Fish & Wildlife Service (USFWS). Michelle was recognized for her skills as a teacher who has created innovative programs connecting people with wildlife and natural resources on the Kenai National Wildlife Refuge.

Over the last twelve years, Michelle has organized and presented numerous campfire, nature walk, and discovery hike programs, as well as training and mentoring forty seasonal interpreters. In 2005, she was the first USFWS employee in Alaska to become a Certified Interpretive Guide under the auspices of the National Association of Interpretation.

Michelle has employed her skills as a graphic artist in the Refuge Outreach Program by creating a variety of brochures, flyers, posters, and bulletin board displays. She has been a driving force in Refuge "Family Fun Days" which has an annual attendance of over 1200 people, as well as organizing booths and displays at numerous community events from Sports Shows to Safe Kids activities. For the latter, Michelle received the 2008 Partner of Excellence Award from the Safe Kids of Alaska Program.

Michelle and her colleagues host about 3,000 students each year for environmental education programs. She was instrumental in creating nine Refuge-specific environmental education units for elementary grades, three units specifically for Home School students, and six wildlife check-out kits for educators. Michelle has received three USFWS Challenge Cost Share Grants to expand environmental education programs with local organizations, and she has trained and mentored twelve education interns over the last three years.

Last summer Michelle launched the Refuge's first Summer Camp Program for $4^{th}/5^{th}$ graders. In this week-long outdoor day camp, kids had lots of fun with "hands on" learning about Alaska's plants and wildlife. Michelle received a USFWS "Connecting People with Nature" Award for this new program.

Michelle is currently pursuing a satellite Masters Degree in education from Lesley University, with the expectation of integrating art with science to improve the Refuge's nature education programs. Michelle's commitment and enthusiasm to share nature with the kids of our community in fun, innovative ways makes her very deserving of the special recognition brought by the 2009 Alaska Region Sense of Wonder Award.

Deputy Refuge Manager Doug Staller summed it up well by saying, "Michelle is everything I think the Sense of Wonder award winner should be. She's an on-the-ground provider of programs. She's creative, enthusiastic and infuses others with a passion for sharing the natural world." Great job, Michelle!

Candace Ward has worked at Kenai National Wildlife Refuge for twenty five years and has been honored to be Michelle Ostrowski's supervisor and colleague for twelve years. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Did woolly mammoths roam the Kenai Peninsula? Part I

by Ted Bailey

Dr. R. Dale Guthrie emeritus professor at the University of Alaska-Fairbanks holds the tooth of a woolly mammoth. He proposed that a unique vegetation type—the Mammoth Steppe—allowed woolly mammoths and other ice age fauna to survive in Alaska and other high northern latitudes during the Pleistocene Ice Ages. Photo Credit: Mareca Guthrie.

Fascinated by ancient animals, my interest in mammoths began in earnest in 1975 when I first saw the recently discovered Mammoth Site at Hot Springs in the Black Hills of South Dakota. Because we periodically visited my wife's sister who lives nearby, I had the opportunity to revisit the Mammoth Site many times over the past 30 years. So far the remains of over 50 mammoths have been uncovered and up to 100 may have been buried there about 26,000 years ago after they became trapped in a collapsed sinkhole. The site now claims to be the world's largest mammoth research facility.

Last year I also visited the famous La Brea Tar Pits in California where mammoths along with numerous dire wolves, saber-toothed cats and other animals were trapped and preserved in seeping tar pits beginning about 40,000 years ago. Later, near the town of Crawford in northwestern, Nebraska I saw the fossilized remains of two male mammoths that died about 12,000 years ago after their tusks became interlocked while fighting.

The American or Columbian mammoth (*Mammuthus columbi*) is the dominant species of mammoth at the South Dakota site, as well as at the La Brea Tar Pits and Nebraska sites. Columbian mammoths were an older and larger species found in many places across the contiguous United States. It is believed their ancestors (*M. meridionalis*) entered North America via the Bering Land Bridge about 1.7 million years ago. In contrast, the species of mammoth found in Alaska, called woolly mammoths (*M. primigenius*), were a later-developing species. Woolly mammoths were smaller and better adapted to a colder climate with long hair and short ears.

Although long extinct, mammoths continue to make headlines. Late last year geneticists using hair follicles sequenced a large proportion (an estimated 80%) of the genome—the DNA found in the nucleus of cells—of two frozen woolly mammoths found in Siberia. This and other recent genetic research on mammoths has allowed scientists to estimate that mammoths and elephants shared a common ancestor in Africa about 6 million years ago.

Recent genetic research also suggests there were three main groups of woolly mammoths: an exclusively Asian form, an exclusively American form, and one form that lived in both places. This evidence suggests that American woolly mammoths probably originated in America about 464,000 years ago, migrated west into Asia between 200,000 to 300,000 years ago and replaced two more primitive and indigenous

groups of woolly mammoths there. Later—around 11,500 years ago—the American woolly mammoths and their migrant progeny in Asia and Europe became extinct at the end of the last ice age.

For decades scientists have debated whether climate change or over-hunting by early humans—or a combination of both—caused the extinction of mammoths. But in January 2009, researchers reported in the journal Science evidence in the form of microscopic diamonds (nanodiamonds) apparently formed during the impact of an extraterrestrial object—a swarm of meteors or a comet—that exploded somewhere over Midwestern North America about 12,900 years ago.

The nanodiamond researchers propose that the impact caused an abrupt major climate cooling and the onset of a cold period known as the Younger Dryas that lasted about 1300 years. Although other scientists are skeptical and not yet convinced, the researchers propose that one of the numerous consequences of this extraterrestrial impact was the sudden demise of mammoths and other large mammals in North America during the last Ice Age. This hypothesis aired on PBS's science program NOVA as the Last Extinction this past Tuesday evening (March 31) and will probably be repeated again at 6pm on Sunday April 5.

Turning now to our own area, what factors must be considered to address whether or not woolly mammoths once roamed the Kenai Peninsula? One factor is the type of food mammoths ate. Analysis of the food remains in the stomachs and intestines of frozen woolly mammoths indicates that they were primarily grazers that fed on grasses and sedges and to a lesser extent on twigs of dwarf willows, herbs and mosses. Some scientists believe that woolly mammoths and other ice age fauna were able to live in high northern latitudes because of the existence of a unique type of cold, windy and dry grass-dominated vegetation unlike the wet shrub-tundra vegetation found at the same latitudes today. Paleontologist Dr. R. Dale Guthrie at the University of Alaska-Fairbanks first described this cold, windy and dry grassland vegetation type—which no longer exists—as the "Mammoth Steppe;" steppe is another name for grasslands. And, although the exact structure and extent of the Mammoth Steppe is still being debated, it appears that this landscape was most likely a mosaic of vegetation types dominated by the cold, dry grassland but interspersed with wetter sedge-moss meadows.

During the last glacial maximum, about 18,000 years ago, woolly mammoths inhabited the grassland steppes in an extensive ice-free area that included the interior of Alaska and the Yukon Territory, the connecting Bering Land Bridge (Beringia) and across northern Asia and Europe.

At this time, however, most of the Kenai Peninsula was still buried under ice. Geologist Dick Reger who has studied the glacial history of the Kenai Peninsula has shown that only a few isolated mountaintops and ridges in the northwestern Kenai Mountains, the Caribou Hills area and several large lowland lakes remained ice-free during the maximum extent of latest Pleistocene glaciers. The unglaciated uplands were small and isolated, and probably could not have supported a population of woolly mammoths even if they could have migrated from the Interior over miles of snow and ice to reach the Kenai Peninsula.

But what about the period after most of the Kenai glacial ice had melted and mammoths still lived in the Interior, say between 16,000 and 11,500 years ago?

There is no evidence that an Interior-like "Mammoth Steppe," ever existed on the Kenai Peninsula, but pollen samples from several lakes in southcentral Alaska and on the Kenai Peninsula analyzed by Tom Ager of the U.S. Geological Survey indicate an herb-tundra first became established in the lowlands as early as 15,400 years ago. Although this might have been suitable habitat for woolly mammoths, it apparently did not last long.

Additional data from other Kenai Peninsula lake and bog cores collected by Ed Berg and analyzed by Scott Anderson from Northern Arizona University suggest that by about 14,000 to 13,000 years ago the formation of peat in bogs began and shrubs such as willow, alder and dwarf birch began to appear and became established after about 10,700 years ago, followed later by white spruce and still later (about 4000 years ago) by black spruce.

These warm, wet, shrub-dominated habitats would have been unfavorable to mammoths. Therefore except for a relatively brief period of time (15,400 to 14,000 years ago), the postglacial Peninsula was probably too wet and warm to support vegetation favorable to mammoths.

There is however a still earlier possibility to consider, which was a relatively warm period prior to the last major ice advance. This period, which could be called the last "interglaciation," was one of many pauses in the Pleistocene glacial period that began 1.8 million years ago. This pause occurred between 30,000

to 60,000 years ago, according to the Greenland ice core temperature record.

Unfortunately, we know very little about the vegetation of this period. Anything growing on the landscape would have been destroyed or buried by the last glacial advance, which on the Kenai began 27,000 years ago and reached its maximum extent 23,000 years, so the chances of finding mammoth remains from this period are very slim, if mammoths indeed could have found anything to eat.

Another factor to consider is the age of the last woolly mammoths known to have survived in the interior of Alaska. According to a 2006 article in Nature magazine by Dale Guthrie, the latest known radiocarbon-dated woolly mammoths uncovered in the interior of Alaska and the Yukon Territory were about 11,500 years old; no younger specimens have been found, although some mammoths apparently survived longer, until about 8,000 years ago but only on St. Paul Island in the Pribilofs. And a dwarf woolly mammoth survived as late as 4,000 years ago on Siberia's isolated Wrangel Island.

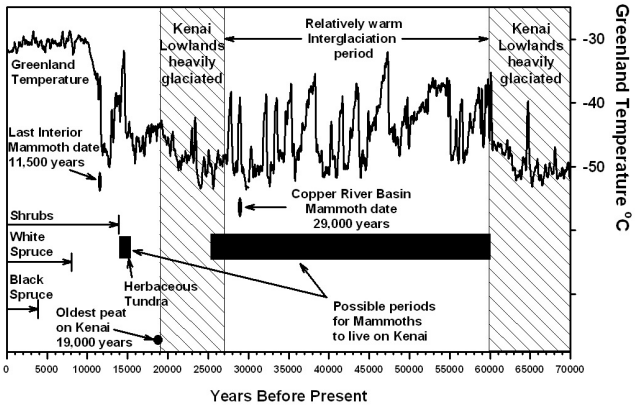
Guthrie also showed that during a critical period from about 13,500 to 11,500 years ago the vegetation in Interior Alaska and the Yukon shifted from a very cold dry steppe dominated by grasses, sedges and sage (*Artemisia*) to a warmer, moister shrub-tundra dominated by abundant graminoids and edible woody shrubs especially willow, a habitat more favorable to moose. If woolly mammoths did somehow manage to disperse across ice and snow-covered mountainous terrain from the Interior to the Kenai Peninsula, the available evidence suggests they would have had to do so between 13,000 to 11,500 years ago because after about 11,500 years ago the vegetation was apparently becoming more unfavorable for their food requirements both in the Interior and on the Kenai.

Note: Part II of this article will examine reports of remains of woolly mammoths in the Cook Inlet basin and on the Kenai Peninsula and possible scenarios explaining their presence on the Kenai Peninsula.

Ted Bailey is a retired Kenai National Wildlife Refuge wildlife biologist who has lived on the Kenai Peninsula for over 32 years. He maintains a keen interest in the Kenai Peninsula's wildlife and natural history. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Did woolly mammoths roam the Kenai Peninsula? Part II

by Ted Bailey



Although no scientifically confirmed mammoth fossils have been found on the Kenai, there are two possible periods when the vegetation was suitable and the western Kenai lowlands were more-or-less ice free. During the most recent period (14 -15,500 years ago) an herbaceous tundra vegetation could have supported mammoths, but starting 14,000 years ago the vegetation became too shrubby for mammoths, who grazed mainly on grass and sedges. The temperature record was reconstructed from ice cores taken near the center of the Greenland icecap (R. Alley, C. Huber and others); Kenai temperatures were much warmer but probably followed the same general pattern. (Graphic by Ed Berg)

Although woolly mammoths lived in Interior Alaska before, during and shortly after the last major glaciation, it is uncertain if they could have traveled from the Interior to the Kenai Peninsula after the last lowland glaciers on the Peninsula retreated. However, woolly mammoths may have made it to the Kenai Peninsula during an earlier period between the maximum extents of the last two major glacial advances. There is documented evidence—the buried leg bone of a mammoth found in the Copper River basin—that the range of woolly mammoths extended further south than the Interior of Alaska about 29,000 years ago (see graphic). Possibly, they could have made it down to the Kenai Peninsula at this time.

What is the current evidence for mammoths on the Peninsula?

So far, the evidence is problematic, but intriguing, with many unanswered questions. Perhaps the earliest account (1943) of a proposed mammoth bone in the Cook Inlet basin was by University of New Mexico archeologist Frank C. Hibben. The proposed mammoth remains were associated with supposedly very early human artifacts on the south shore of Chinitna Bay on the west side of Cook Inlet. But a follow-up investigation in 1978 could find no geologic or archeological evidence validating the report, and samples dated by radiocarbon at the site was much too young (400 years) for mammoths. The investigators concluded that the 1943 report of mammoth remains and early human artifacts was invalid; the proposed mammoth bones were probably whale bones and the human artifacts were from a much later human occupation.

More recently—in 1976—a water-worn mammoth tusk was reportedly found on the beach at the base of Homer Spit but the present location of tusk is unknown. The geologic setting of the tusk, its age and how it arrived on the beach remain unknown.

Then, as Janet Klein reported in her recently updated book *Kachemak Communities: Their Histories, Their Mysteries*, between 1991 and 2007 a piece of a tusk, two molars and a toe bone of a mammoth were reportedly found by four people on the beaches between the mouth of the Anchor River and Homer Spit. However, none of these mammoth finds have been verified and their origin, geologic setting and age again remain unknown. Perhaps noteworthy is that extreme 100-year floods and severe erosion occurred on the southern Peninsula along the Anchor River and other southern Peninsula streams in October and November of 2002. Less erosive floods occurred along the Anchor River in mid-1980s and 1992. Could these floods have eroded mammoth remains from somewhere in the Anchor River, Fritz Creek or Deep Creek watersheds and carried the remains downstream into Cook Inlet to be later washed up on the nearby beaches?

We can speculate on various scenarios about the origin and presence of woolly mammoths on the Kenai Peninsula, but until woolly mammoth remains are found that can be verified, examined and dated, their origin and presence on the Peninsula will be ques-

tioned and will remain a mystery. One possible scenario proposed by geologist Dick Reger is that sometime between about 60,000 years ago to about 25,000 years ago when Kenai glaciers were restricted to the mountains, woolly mammoths dispersed out of Interior Alaska through an ice-free area into the Copper River basin and then southward to the Kenai Peninsula.

Of the mammoths that died, some could have buried in the Caribou Hills area, which remained ice-free—a refugium—during the last (Naptowne) glaciation. During that time the remains of other mammoths that may have died on the Kenai lowlands were either destroyed or deeply buried by the last glacial advance. But remains of mammoths that died in the ice-free refugium in the Caribou Hills could have been subsequently eroded from a stream bank, carried downstream into the Cook Inlet and deposited on the beach. Dick Reger recently calculated the ice-free region to be roughly 510 square miles, not a small area.

Another scenario is that mammoths somehow managed to disperse from the Interior to the Kenai about 13,000 years ago after the ice retreated from the Kenai lowlands and the young herbaceous tundra habitat became briefly favorable for mammoths.

To resolve these speculations, an ideal situation from a scientific viewpoint would be for someone to find, photograph, and leave the remains of a mammoth still embedded in the geologic layer in which they were deposited and to notify scientists who can verify that the remains are actually those of a mammoth. Scientists could then carefully excavate the remains, simultaneously collecting ecological information from the site and radiocarbon-dating the remains (bone, tusks or teeth).

Less ideal but still informative would be to have the persons now in possession of the mammoth remains from the Homer area come forward to allow scientists to extract a tiny sample of the bone, tooth or tusk for radiocarbon dating. That may at least give scientists an indication of whether the mammoth died a very long time ago between glaciations or after the last glaciation. I am confident that eventually the mystery associated with these reported finds of mammoth remains on the Kenai Peninsula will be solved and that our knowledge about the distribution and lives of woolly mammoths in Alaska will be further enhanced.

I would like to thank geologist Dick Reger; ecologist Ed Berg at the Kenai National Wildlife Refuge; research geologist Tom Ager at the U.S. Geological Survey in Denver, Colorado; and anthropologist Alan Boraas at the Kenai Peninsula College, for information on the geology, climate history, radiocarbon dates, paleoecology, mammoth finds and prehistory of the Kenai Peninsula and Cook Inlet basin and for their constructive comments in my writing of this article. I also thank Jacqueline McDonough, Curator of Collections at the Pratt Museum in Homer for information on reported mammoth finds in the Homer area and emeritus professor Dr. Dale Guthrie, University of Alaska-Fairbanks for permission to use his photograph in Part I of this article. For further general reading I recommend Dr. Guthrie's book *Frozen Fauna of the Mammoth Steppe: The Story of Blue Babe*, as well as *Mammoths: Giants of the Ice Age* by Adrian Lister and Paul Bahn.

Ted Bailey is a retired Kenai National Wildlife Refuge wildlife biologist who has lived on the Kenai Peninsula for over 32 years. He maintains a keen interest in the Kenai Peninsula's wildlife and natural history. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Kenai Refuge youth leader sets fast pace through Mexico

by Ryan Beltz

I am a seasonal ranger and the youth conservation corps program coordinator at the Kenai National Wildlife Refuge. I usually spend my off-season winters traveling—either by foot, bicycle or motorcycle. This past winter I bicycled about 2000 miles through Baja California and Southwestern Mexico.

It sometimes seems easier to recount a trip in terms of hours rather than days. At home events happen in real time, meaning they are quantifiable and seem to fit into the normal scheme of night and day. On the road it's much different. Events happen so quickly. Everything is bright and new and demands attention, resulting in an overload of stimuli that seems to transcend the typical 24-hour clock. I sit at night my thoughts drifting back over the day and I think, my God, it was only this morning that I was in Oaxaca, or last night I was on a cargo ship bound for Mazatlan, or three hours ago I was being dragged off the road into the desert by hurricane force winds. To oscillate between these worlds, travel and home, is to experience the full gamut of human emotion. As I write this, I mull over events so intense that hours passed like seconds, set against the ticking of the clock in the corner or the click of the keys as I punch my thoughts onto paper. I am living two different lives, almost beyond connection.

For over a month I toiled over sand and stone through desert and sun as I wound my way through Mexico, always pedaling toward some distant point on the horizon. I began the journey with four others, but through fortune and fate and collisions with trucks I found myself bicycling alone, perhaps for the better. Anybody who has traveled with and without partners knows of the joys and sorrows of traveling alone. The experiences are heightened, emotions ebb and flow like an unbridled sea without a shoreline or coast on which to rest.

In this vain, I rolled over the land of Baja California. My goal was the southern terminus of the peninsula La Paz, some thousand miles distant, then onto mainland Mexico. The days and nights passed, piled upon each other until time no longer seemed to matter. I was lost in the present. My life hinged upon the moments I was living. It was the food I was eating. It was the water I was searching for. It was tents and motels and trucks blowing past my handlebars with a hell-bound fury. Looking back, I see my journey as a linear progression of events and faces, the clock and calendar are lost on such things…

Morning saw me riding through waves of heat towards the outline of a sun-bleached shack. Oh, the glory of the hole-in-the-wall diner, not featured on any map and barely visible to the naked eye, but like a mirage in the desert the planks of discarded pallets rise above the dust and needles. It was to be half a day's ride to breakfast, but like a steak to a starving man my elation found refuge in the form of a few sticks and tin.

I walked into the tiny room, my eyes adjusting to the dark and glow of twinkling lights, a haloed effigy of the Virgin Mary presiding over the dining table. I sat in a crooked and broken chair admiring the construction of such a house—the walls had more holes and gaps than wood—the pocked tin roof supported by a single worn and eaten, termite infested beam—a lone bulb dangled from above with wires exposed.

A lady in simple dress and missing shoes asked what I would like to eat. I ordered my standard breakfast fare: machaca (dried beef), eggs, beans, tortillas, cheese and coffee. This is a protein-powered breakfast, one that had been serving me well for the previous days. She retreated into the kitchen, separated from the dinning area by a pallet and few jugs of wa-

ter. One burner and two kids in the kitchen, one on her hip, the other scampering about the folds of her dress. A young daughter served my coffee in between the rings of her cell phone. Dust blew through the holes and gaps as trucks rumbled past. The golden hew of morning faded from the open door as this desert world prepared itself for another day on the shadeless llano.

Half-way through my breakfast the father walked into the room—in one fluid motion taking a metal cup from a bent nail and dipping into one the jugs of water, a long draught, the smacking of lips, drops wiped from his beard with the back of a dusty hand, the cup making a small clinking sound as it swung from its perch, the man back to work before the cup was quiet. A full stomach, a cup of coffee… happiness.

I rode into the village after spending eight hours and a hundred plus miles in the saddle only to find that the motel I was planning on had closed some years earlier. As I sat pondering my situation with unfolded map, a local shop owner approached and suggested that I sleep on the floor of his flower shop. With fading light and faltering energy I graciously accepted. As I moved my gear from bike to floor, I was instantly surrounded by a host of children, intently focused on my every move. Feeling the bit of a sideshow, I played the part and produced the novelties I carried. I cooked for them on my little stove and showed them my sleeping gear as well as a map of Mexico. I sat and watched as ten grimly little fingers traced the 1500-mile long route I had so far ridden through the Baja, over the sea and to their homes.

A half hour after my arrival the novelty passed and the children darted back into the fading light amid fits of shouting and laughter. I woke early the next morning well before 5 am and sat on the steps of the shop watching the night slowly fade to day, eating leftover pasta and fruit. Every so often a man or women would emerge from the darkness passing by my perch, lunchbox or machete in hand, marching towards a day of toil in the fields.

A truck passed a few minutes later, its cargo a living mass of hands bound for those same fields, valued only for the work they produce. The owner of the store refuses payment. He says he is pleased that he can offer to me a place to sleep. I look at his possessions and realize just how generous he is being. Out of nothing rises limitless generosity. I leave tips and tokens as gratitude, knowing full well that I eat more in a day than he does in three and for what? To fuel my ambition for sport and adventure? These people live on much less than I and lead harsher, coarser lives. Despite their meager possessions I hesitate to use the word "poverty." For, I listened all night long as people talked and laughed outside my door. At what price then comes happiness?

Ryan Beltz is a Seasonal Ranger and the Youth Conservation Corps Program Coordinator at the Kenai National Wildlife Refuge. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Large ice-shoved ramparts tell of wetter, stormier times

by Ed Berg

Geologist Dick Reger inspects ice-shoved ramparts at Cow Lake. The lake is to the left. The ramparts are located 250 feet from the lakeshore at a height of 24 feet above the present lake water level. Photo Credit: Ed Berg/USFWS

"Where are the soldiers?" I asked myself when I first saw the big berms west of Cow Lake. The two parallel earth berms running through the woods looked very much like Civil War fortifications, and you could easily imagine riflemen positioned behind them firing at an attacking enemy.

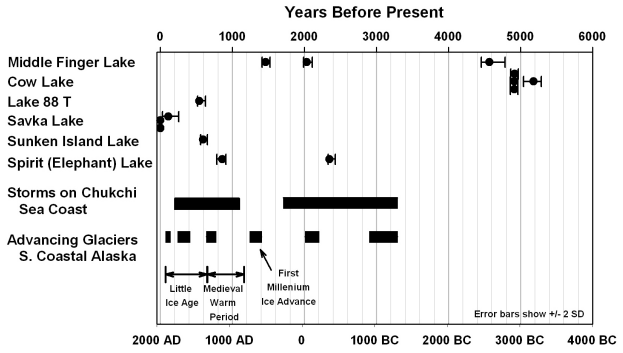
I had seen such berms before, but always on the shores of lakes. At Cow Lake the berms were 250 feet back in the woods and were about 24 feet above the present lake level. My colleague and fellow hiker on that day in September 2007 was geologist Dick Reger who immediately identified these berms as "ice-shoved ramparts," similar to ones that he had seen northwest of Tok on the shore of Moosehead Lake. Dick retired a few years ago from the Alaska Division of Geological and Geophysical Surveys and has written extensively on the glacial history of Alaska. He was sure that these berms were not glacial features, such as moraines or eskers.

Ice-shoved ramparts are formed in the spring when lake ice breaks up into large pans. Strong winds, typically from the northeast, drive these pans onto the shore and they bulldoze up lake sediments and soil into berms.

I remember camping in 2001 on a 10-foot high rampart on Barabara Lake near Point Possession while doing forest surveys. I drew a small sketch in my field notes. This rampart was about two feet above the lake level, and I wrote in my notes, "Could ice push have created this berm at a time of higher water level? I have never seen ice push create more than a 12-18 inch berm. Very Strange!" My sketch also shows a smaller 1-foot berm on the lake side of the large rampart.

Similarly, in 2005 my field party camped behind a 4-foot rampart on the shore of Lachbuna Lake in Lake Clark National Park across Cook Inlet. My field notes also mention a larger 10-foot "moraine" back in the woods, which I would now interpret as a second ice-shoved rampart, formed at an earlier time.

A large ice-shoved rampart on the west shore of Spirit (Elephant) Lake. The lake is to the right and downhill from Kenai Refuge biological technician Toby Burke. Photo Credit: Ed Berg/USFWS



Radiocarbon dates of ice-shoved ramparts (berms) on lakes in the central Kenai Peninsula. These large berms are created by the bull-dozing action of wind-driven ice pans during spring break-up. They may have formed during periods of extreme precipitation and strong springtime winds accompanying changes in North Pacific weather patterns. Graphic Credit: Ed Berg

It was however at Cow Lake that I began to appreciate the climatic significance of these ramparts. The large ramparts at Barabara and Lachbuna Lakes certainly reflected very strong wind conditions. Ask yourself what kind of wind would it take to make an ice pan bulldoze up a 10-foot high berm? Next ask yourself, what kind of climate would it take to make lake levels 24 feet higher than modern lake levels, as at Cow Lake?

Cow Lake is a closed-basin lake with no outlet, unlike Barabara and Lachbuna Lakes. Closed-basin lakes are good recorders of precipitation or more precisely, of "available water" after precipitation has been reduced by evapotranspiration. Add 24 feet of water to any lake and you have a much wetter climate. Add 10-foot high berms and you have a much stormier climate, or at least extremely strong winds in the spring.

Since our Cow Lake discovery, Dick Reger and I have found ice-shoved ramparts on seven more central Kenai lakes. The ramparts are typically on the southwest ends of lakes, as you would expect from strong northeast winds. They are best formed in sandy soils which slope gently down to a shallow lake margin which faces several hundred yards of fetch across the lake. This configuration allows the wind to pick up speed and effectively bulldoze ice pans through soft lake sediments and sandy soil, depositing the berms well back from the lake edge.

We have seen as many as five ramparts, lying like topographic ripples along a lake margin, e.g., Pollard Lake. Presumably these ripples progress from younger to older as you move away from the shore, because an older rampart would be destroyed by more recent ice shoving. We can see distorted layering in ramparts that we have excavated, and can sometimes identify two or more distinct shoving events.

To date a rampart we dig a soil pit on the landward face, trying to excavate down into the original soil layer over which the rampart was deposited. If we find an intact soil profile, we look for organic matter that might have been the original forest floor or perhaps charcoal from an old fire. We send these samples to a lab in California for radiocarbon dating.

We have so far dated ramparts at six lakes. To our surprise, these ramparts all dated to within the last 5200 years. The land in this area has been free of ice from the last glacial period for about 19,000 years. We know from lake sediment studies that the Kenai climate has generally cooled and become wetter over the last 9000 years, but we have had hitherto no record of really extreme wetness suggested by the high lake levels at closed-basin lakes like Cow Lake (24 feet), Sunken Island Lake (15-20 feet), and Middle Finger Lake (8.5 feet).

The dates are strung out from as young as mid-20th century (Savka Lake) to as old as 5200 years (Cow Lake), with a concentration within the last 900 years. We interpret this distribution cautiously, however, because as I said, younger events tend to destroy evidence of older events, just like glaciers do, so we would expect to detect more younger events than older ones.

We suspect that the ice-shoved ramparts are part of a large regional climate trend, perhaps a series of stormy, high precipitation anomalies that have occurred over the last 5200 years, reflecting major changes in the North Pacific weather system. If this is true, our story will be useful for global climate models that forecast the effects of global warming. These models must be calibrated with data about past climate history if they are to accurately forecast the future climate. Properly calibrated climate models should be able to run backward in time and accurately "backcast" the past, which obviously requires that the model makers know what happened in the past.

We are busy trying to collect evidence of other extreme weather events in the last 5200 years and have some suggestive leads. For example, periods of intense storm activity along the coast of Cape Krusenstern and Cape Espenberg in northwestern Alaska beveled off beach ridges and barrier islands in two periods (200-

1100 and 1700-3300 years ago), according to studies by Owen Mason and James Jordan on the Chukchi Sea coast.

We also have an increasingly good record of glacial advances and retreats in southern Alaska, due to the work of David Barclay, Greg Wiles and colleagues. On the Kenai glaciers advance during cooler summers and retreat during warmer ones. While cooler summers tell us nothing about storm activity, they could be wetter times due to less evaporation and more winter precipitation.

To firmly connect the ice-shoved ramparts story to the climate history record, we need to examine and date many more ramparts around the Kenai, across Cook Inlet and in southern Alaska generally. We appeal to readers who have seen these features to contact us with information about them. Stay tuned: this is definitely a work in progress!

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Forgotten bulldozer in the bushes reveals 1958 saga

by Gary Titus

Bulldozer in Moose Creek

Years ago a friend and I were exploring the remote Upper Russian Lake region on the Kenai Peninsula. We started hiking from the end of Snug Harbor Road following the Russian River Trail through stands of spruce and shadowed by snow-covered peaks, until we reached the shores of Upper Russian Lake. We then decided to explore the wilderness off the trail and set out along the shoreline of this large lake, hoping to reach Goat Creek.

After hiking for awhile, we noticed a faint trail heading into the woods. As always, we had to see where it would take us. The trail continued a short distance from the lake through a wet boggy area until it entered a hemlock forest. We expected to find an old campsite, or even more exciting, an old trapper's cabin, but the scene before us was totally unexpected. There, in a stand of hemlock trees, sat a large yellow D-7 Caterpillar. This is not something you would expect to see in the wilderness, let alone far from any roads or people. So the historian in me had to know what it was doing there and how did it ever reach this far from roads into the wilderness. Here is the story of what we had discovered.

The watershed of the Russian River starts high in the remote Chugach Mountains above Upper Russian Lake. As a result of the low proportion of glaciers in the watershed, the water in the Russian River is very clear. Stream flows are most affected by summer snowmelt and fall rainstorms. Any sediment that enters the river settles out in Upper and Lower Russian Lakes.

Just southeast of Upper Russian Lake, in the watershed of the Resurrection River system, is a small, moderately glaciated stream by the name of Summit Creek. This stream is the primary headwaters of the Resurrection River system. Summit Creek forms an alluvial fan on a broad pass separating the Russian and Resurrection River watersheds.

Normally, the glacially silted Summit Creek flowed into the Resurrection River system, while the Russian River watershed received its water from clearwater sources like snowmelt and groundwater seepage. This all changed sometime in the late 1950s. A flood sufficiently shifted the Summit Creek bed and changed its course to allow the glacial silt waters to flow into the clear waters of the Upper Russian River system.

This had the potential to alter the ecology of the entire lower end of the drainage and the Russian River salmon fishery. So in 1957, the Kenai National Moose Range, the agency which then managed the river, decided human intervention was needed to move Summit Creek back into its original channel.

Alaska Regional Refuge Supervisor David L. Spencer contacted the Air Force, Alaska Railroad, Bureau of Commercial Fisheries, Bureau of Land Management, Bureau of Public Roads, and the Forest Service to provide the manpower, equipment, helicopter,

and supplies for the undertaking.

The plan was to move a D-7 Caterpillar overland while the ground and rivers were frozen in order to have it on site in the spring when the work could be accomplished. So a cat was obtained and transported to Seward. The eighteen-mile, two-month adventure of misery, frustration and hilarious comedy of errors up the Resurrection River began with deep snow, mechanical failures and a session with the D-7 incapacitated in "Misery Creek."

The trip began from Seward on March 5, 1958 and the day's progress of seven and a half miles up Resurrection River seemed promising. The men spent the night camped out with hopes of finishing the trip in the next couple of days. As with most trips, a first day of travel without difficulties should have foretold the future.

What lay ahead were days filled with deep snow, mechanical trouble and minuscule progress. The trip soon ground to a halt in the icy waters of Moose Creek, later renamed Misery Creek by the crew. It was here that the dozer broke through the ice and, if that wasn't enough, a track came off. The men worked in the cold waters and on snow-covered banks, and they were able to repair the track, only to have the cat mired deeper into the icy waters of the creek when they attempted to extract it.

With the large dozer mired in Misery Creek, the decision was made to bring in a small D-4 Caterpillar in hopes of using it to extract the D-7. The men hiked back out to Seward to put the next phase into action.

The men returned, taking another three days to reach Misery Creek with the D-4 dozer. The wet, cold job of extracting the D-7 from the waters of Misery Creek began. After a day of back-breaking work, the larger cat stubbornly remained in the waters. With the D-7 incapacitated in Misery Creek, the decision was made to continue with the D-4 to Summit Creek the next day to check out any further difficulties. The trip was made in two days and the crew finally saw Summit Creek. The trail was now blazed. The men returned to Misery Creek and continued to work extracting the captive D-7 from its waters. A day was spent rigging block and tackle, and finally the cat slowly emerged from its watery prison and was repaired.

On April 30th, the men broke camp and left Misery Creek without a backward glance and moved on to Summit Creek. They arrived at 8 pm without any further difficulties. Here the cat would sit waiting until the spring thaw.

The intended mission was accomplished during the spring of 1958. The crew worked ten days constructing a 1,300 cubic yard dike to divert the silt-laden Summit Creek back into the Resurrection River. After the work was done, the agency left the larger cat near the dike in case further repairs were needed and the smaller cat was taken back to Seward. The costly and time-consuming project was finally brought to completion.

If the creek should break through the dike now, or in the future, I would expect that the decision would be made to let nature take its natural course. There is basically no reason to worry about the Russian River's ecosystem or the fishing. The Upper and Lower Russian Lakes would most likely continue to filter out the silt as they have done for ages, so the sockeyes can continue their annual journey, through the bears and people, to reach their final destination. With the mystery of the D-7 solved, I can continue exploring and finding answers to other questions, of which there are many to keep me busy for years.

Gary Titus has been a Backcountry Ranger, Cabin Manager, and Historian at the Kenai National Wildlife Refuge, since 2000. He has been hiking on the Kenai at every available opportunity since 1979. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Biologists to study shorebirds on Chickaloon Flats this summer

by Sean Ulman

View of Chickaloon Flats on the south side of Turnagain Arm. Photo Credit: Sadie Ulman

Sandhill cranes' rattling purrs, purl earthward. In this music I sense a fleeting nexus between the natural world and an ancient species of birds—a piece of peace—and then reflect on how, in birding, the ear may meet the value of the eye. Audibly concentrating on the pealing wooden bugles, I remind myself that in the field my hearing, perhaps extra-sensitive from compensating for meager vision, may be an asset.

I gladly crane my neck to watch a three-armed V-formation of 65 Sandhill cranes collapse and overlap. The clustering birds nearly collide as they jam up and swirl in differing directions above the shoreline. Three mini V's join the traffic and the tall long-winged symbols of survival, endurance, and grace, peel into formation. As they soar across Cook Inlet toward Mt. Redoubt, fog shrouded and steaming, I imagine watching time steps of peeping shorebirds swarm and swing over muddy pools on the Chickaloon Flats.

Sadie Ulman, a wildlife ecology graduate student at the University of Delaware is conducting her first field season this spring in cooperation with the Kenai National Wildlife Refuge on Chickaloon flats. Her project will focus on the value of the site as a stopover grounds for migratory shorebirds such as long-billed dowitchers and greater yellowlegs.

Since little research has been done on this area of mud, grasses and tidal sloughs since 1971, a range assessment of the habitat (the stats of the flats, if you will) will also be of interest. We will be at the remote field site this summer and next when the birds push north in May and return for a similar stint for the migration south in July and August.

Sadie Ulman scanning the landscape for her shorebird study on Chickaloon Flats on the south side of Turnagain Arm. Photo Credit: Sean Ulman

Aerial View of the Chickaloon Flats study area where Sadie Ulman is conducting research for a shorbird study as part of her master's thesis. Photo Credit: Ulman

I am her field technician and her husband. In preparation for the rigorous demands of the job I have become accustomed to considering myself her technician or employee first and spouse second. While Sadie has worked field seasons studying wild turkeys, grassland-nesting birds, sandhill cranes and Steller's eiders, two days of reconnaissance on the flats last August is the extent of my field experience. It's fair to say nepotism facilitated my hiring but it is my more than occasional opinion that fieldwork of this variety is no favor.

We'll mud-tromp ten-plus hour days across the flat terrain of this exposed section of Turnagain Arm vulnerable to frequent wind, rain, cold, heat, bugs… And the list of ordinary pleasures one surrenders is extensive (showering, shooting hoops, dining out, hanging out with friends, watching Bruins NHL playoff games…). When the numerous challenges grow daunting my mind seeks solace in birding.

I was not interested in birds as a child. My mom kept three porch birdfeeders stocked with seed, but I can't recall noticing the colors or chittings of flitting goldfinches, titmice, black-capped chickadees or northern cardinals. I have always been a collector. I hoarded sports cards and figurines longer than I care to admit and bought 'original game' sports and college caps by the dozens. By college I yearned to glean more words to use in my short stories, so I collected books and soon entire catalogues of my favorite authors. Being a veteran collector, the magic of binoculars (super-hero vision) and having so many chances to tag along on birding walks eased my evolution into a birding hobbyist. I see birding as many things now—a way to process some world processes, a calming connection with nature, a surplus of new color and sound, scientific study, eye exercise, inspection of intricate details… but I first understood it as collecting.

After a birding session birders jot down in journals the names and behaviors and numbers of birds they heard or saw. They add to their hallowed life lists every time they see a bird they've never seen. By accumulating sights and sounds rather than objects, birders are collectors in a pure unselfish sense.

I'm elated and always aware when I see a life bird, but it's funny, I've yet to begin tallying my life list. I think I've been holding off until I feel worthy of the respected title 'birder.' I like birding so I like to call myself a birder, but this self-imposed label is hardly certified. Liking birding and wanting to become a better birder as well as hanging out with my wife, I mean working with my boss, are three reasons why I think I will be fine, even happy, living on the Chickaloon Flats for weeks at a time.

One night as we were rolling into park on Cannery Road to glass the vast puddle-riddled fields, I compared the unrest in my stomach to opening a pack of baseball cards. There could be a short-eared owl or another Pedro Martinez insert-card-equivalent out there.

We watched 61 sandhill cranes feed among 48 greater white-fronted geese, smaller rapid-honking birds with speckled bellies and orange legs. I noticed a couple dozen of the cranes had feathers that were stained a rusty orange. I had learned this was caused by properties of mud further north. I had a question. When I'm birding I always have a lot of questions, but I've learned to stockpile them and wait to ask after Sadie is done recounting individuals and rejoicing, at least until that sacred first-look phase of arrival has passed.

For several weeks I have been helping collecting gear (rainwear, waders, layers, gloves…), tools (banding pliers, needles, sample containers, waterproof notebooks…), groceries (oatmeal, bars, soups, sauces…), as well as collecting my mind. Now the initial indicative collection period phase of the project is upon us. I will help capture birds in nets (whoosh, drop, mist, gun) in order to collect blood and feather samples. Each bird will be individually banded so if another bander collects it later on, the bird's information can be shared.

I'll also help collect mud samples from which collections of invertebrates, which the birds stop here to

feast on, will be extracted. I have a lot of questions about collecting data and other curiosities about possibilities and potential problems. Soon there will be some answers. Then I'll have more questions. I'm learning this is normal in science. I'm looking forward to being in the field learning about the scientific quest. The amount I don't know is overwhelming at times. But it's okay. I have a good ear. I might start writing my life list. I'll be fine. I like birding.

Sean Ulman received his MFA degree in creative writing from the Stonecoast program at the University of Southern Maine. He is writing a novel about Seward and assisting his wife Sadie Ulman in studying shorebirds on the Chickaloon Flats this summer. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Be nice to nettles!

by Ed Berg

Spring has arrived in full force and it's time to enjoy some nettles. "Enjoy some nettles?" you ask. "Isn't that like enjoying poison ivy or the seven-year itch?" No, Indeed! Nettles are one of the first and finest gifts of spring. Like many prickly types of our own species, you just have to know how to approach them.

Specifically, you approach nettles with gloves; throwaway surgical gloves are nice, but any solid glove will do. Nettles, i.e., stinging nettles, are covered with tiny stinging hairs called trichomes. Each trichome is like a glass hypodermic needle, complete with a little bulb of skin irritants (formic acid, acetylcholine, serotonin, and histamines) at the base of the needle. When skin brushes the leaf surface, the silica-stiffened trichomes break and inject their chemicals into the skin, and red welts instantly appear.

A few minutes cooking quickly breaks down the stinger chemicals and readies the fresh greens for the discerning palate. The easiest way to prepare nettles is to simply steam them for a few minutes like spinach, and serve with butter and salt, or perhaps olive oil and Parmesan cheese. Nettles are also rendered harmless by drying, which allows them to be used for soups during the winter.

Just about any recipe that uses spinach can be improved by using nettles. We have a thick patch of nettles around our driveway, and my wife Sara serves nettles in one form or another most evenings at this time of year, before the plants get tall. Nettle quiche is my favorite nettle dish, and I will try to describe how Sara makes this delicacy, even though she is not one given to precise recipe formulas.

Nettle Quiche

- Pie crust
- 3-4 cups of nettle tops
- Small onion
- Mushrooms
- Grated cheese, ¼ to 1/3 pound
- Fresh tomato
- Bacon bits
- 1 ½ cups of milk
- 4 eggs

Pick the top several inches from nettle plants that are less than a foot tall. Steam the nettles for several minutes until limp.
Stir fry the sliced onion and mushrooms.
Line the unbaked pie crust with grated cheese (cheddar, Swiss, pepper jack are good). Place the steamed nettles on top of the cheese, and cover the nettles with the fried onions and mushrooms. Slice tomatoes should be arranged prettily on top, and garnished with bacon bits.
Beat or blend 4 eggs and 1 ½ cups of milk (or sour cream or buttermilk) together, and pour over the whole pie, up to the edge.
Bake at 375 degrees until done, probably 35-40 minutes. Serve warm or cold. I add a touch of Tabasco sauce, but many would consider that barbaric.

As I noted above, it is best to use the youngest (topmost) part of the young plants. You can extend the useable life of your nettle patch during the summer by repeatedly mowing it, so that there is always a fresh crop of new shoots.

As the plants mature, the stems become very stringy. Nettle fibers are used to make "nettlecloth," just as flax fibers are used to make linen and hemp fibers are used to make rope and cloth. In the First World War the uniforms of German soldiers were

made of nettlecloth, due to a shortage of cotton.

Mature nettles also contain fine crystals of calcium carbonate called "cystoliths" which further reduce their palatability.

Nettles are indeed very well-defended plants and it's interesting to reflect on the evolutionary significance of these defenses. The stinging hairs are a great defense against most herbivores (plant eaters). The moose in our yard eat just about everything else but never seem to get to the nettles. Goats however can eat nettles with impunity, along with tin cans. Goats are indeed highly evolved creatures.

The stinging hairs are a good defense against many leaf-eating insects, but some butterflies and moths (*lepidoptera*) have apparently evolved antidotes to the stinging poisons. The caterpillars of the black and gold Milbert's tortoise shell butterfly (*Aglais milberti*) browse the leaves with relish. At first, the young caterpillars feed together within a loose tent made of silk threads. As they grow in size, the caterpillars disperse on their food plant and eventually make cocoons among the leaves. The bristle-covered caterpillar of the red admiral butterfly (*Vanessa atalanta*), which is black with red bands and white spots feed also on nettles in Interior Alaska. (To see dozens of pictures of these beautiful butterflies on the Web, do a Google search for the names, using the "Images" tab rather than the "Web" tab. They are very popular with photographers.)

In the plant world we often see evolutionary "arms races" between plants and the critters that eat the plants. At the moment, the butterflies are ahead of the nettles, and exploit their advantage by entrusting their children (eggs and caterpillars) to the nettles' chemical defenses. If moose, however, could eat nettles, they would eat the butterfly eggs and caterpillars along with the leaves, so the safe haven nursery would be lost.

In the next round of the arms race, nettles may evolve a new poison that protects the leaves from caterpillars. This will of course work fine until the caterpillars evolve a new antidote. Alternatively, moose might evolve an antidote to nettle poison. On the Kenai, nettle-eating moose would be very bad news for caterpillars, and the caterpillars might have to adapt to an entirely new plant. Then again, the caterpillars might evolve a taste so foul that moose would not eat the nettles if they smelled the caterpillars in the foliage.

These examples may seem far-fetched, but in tropical rainforests chemical ecologists have documented many such evolutionary tit-for-tats by looking at the sequences of precursor molecules that must be synthesized during the production of existing plant toxins. Each of the precursors was probably a temporarily successful defense against some critter, until the critter evolved a way of breaking down that defense. Nettles and their herbivores probably have a similar chemical history, but I don't know if anyone has looked at it.

For most people the nettle rash disappears in a matter of minutes, but some people may suffer for a couple of days. One remedy is to squeeze the juice out of the nettle plant and apply the juice directly to the rash. Jewelweed (touch-me-not) and dock often grow in wet areas near nettles, and they can be crushed and applied directly to the rash. Jan Schofield in her book *Discovering Wild Plants* (Alaska Northwest Books 1989) also advises plantain and the scruffy coatings of fiddlehead ferns for nettle rash.

Finally, I should note that nettles provide abundant seed for small birds, and birds also forage on the caterpillars and other insects such as aphids that live on nettles.

In England nettles are appreciated as an important food for wildlife, as well as for humans, and British conservation website announces May 19-28 as National Be Nice to Nettles Week (http://www.nettles.org.uk), with a variety of nettle and wildlife activities planned for the week. We should have such a week on the Kenai, staring with a nettle quiche competition, or perhaps with a nettle version of the Greek spanakopita spinach and feta cheese pie. Yum!

Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Get some nature into your kids at Kenai Refuge Summer Camps

by Michelle Ostrowski

Two children participating in the Refuge Summer Camp.

Last summer, the weather in our part of Alaska left a lot to be desired. However, the one week of our "Get Out and Get Dirty" Refuge Summer Camp was the only full week of sunshine and blue skies. This year we are hoping for at least four weeks of fantastic outdoor weather since we have expanded the camps we are offering. There will be two different day camps offered and each session is limited to 15 campers; led by four skilled Refuge staff leaders. Each week will be 99% outdoors and 100% hands-on!

Critter Camp: This brand new camp is available to students going into 2nd or 3rd grade this fall. We will be outdoors learning about plants and animals, their habitats, life cycles, and adaptations. The two separate sessions of this camp will occur July 6-10 and July 13-17 with each day starting at 10am and ending at 2pm. Pre-registration will be required and there will be a $50 supply fee per session.

Get Outside and Get Dirty Summer Camp: This camp is available to students going into 4th or 5th grade this fall. The majority of the week will be spent outdoors learning about orienteering, plants, birds, fish, and other animals. The two separate sessions of this camp will occur July 20-24 and July 27-31 with each day starting at 9am and ending at 3pm. Pre-registration will be required and there will be a $75 supply fee per session.

Camp leaders this year are: Michelle Ostrowski, Refuge Education Specialist; Eve Smallwood, Park Ranger; Betsi Oliver, Refuge Environmental Education Intern; and Te'Audra Sanders, Refuge Summer Camp Intern. We are all very excited to be creating and facilitating these camps for the youths in our local communities. Through trail exploration, crafts, science experiments, digital photography, journaling and more, we hope to inspire kids with nature's wonders. You can get a summer camp registration packet at the Kenai Refuge Visitor Center on Ski Hill Road in Soldotna or by e-mailing michelle_ostrowski@fws.gov. The registration deadline is June 30 or until each session fills.

Being outdoors is important—intellectually, emotionally, socially, spiritually, and physically. National Wildlife Refuges across the United States are making efforts to find new and creative ways to draw people of all ages back to the outdoors and the Kenai Refuge is no exception. In addition to the summer camps we will also be offering family activities throughout the summer.

Celebrate Wildflower Fun Day (June 19) and **Wild Berry Fun Day** (August 14): These two community special events take place at the Environmental Education Center next door to the Kenai Refuge Visitor Center. These events will be from 11am to 3pm and will include displays, games, craft activities, theme inspired snacks, and guided ½ mile wildflower or wild berry identification walks on the Keen-Eye trail. Pre-registration is required for the guided walks.

Campfire Programs: Held at Hidden Lake Campground Fridays and Saturdays beginning June 19 and lasting through the end of July, and also the first three Saturdays in August. Programs start at 8pm at the amphitheatre. No pre-registration required.

For directions, pre-registration, or additional summer program information please call Michelle Ostrowski at 260-2839 or e-mail michelle_ostrowski@fws.gov. You can also e-mail Michelle to be added to our event notification list.

So my fingers are crossed and I'm doing a "sun-

shine dance." I hope the month of July will be beautiful weather. But our camps will occur rain or shine and we will be prepared to get wet and dirty while exploring nature. For families without students entering grades 2-5, start planning your outdoor summer fun and get outdoors. Join us for a Refuge-sponsored event or get out on your own to camp, fish, hike or watch wildlife on your National Wildlife Refuge and encourage others to do the same.

Michelle Ostrowski is the education specialist at the Kenai Refuge and has assisted with educational school groups and outreach since 1997. She is the 2009 recipient of the US Fish & Wildlife Service Sense of Wonder Award for Region 7. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Chickaloon Flats journal entry

by Sean Ulman

Photo of Chickaloon Flats Short-billed Dowitchers. Photo Credit: Sean Ulman

Sean Ulman is assisting his graduate student wife Sadie Ulman with her research on migrating shorebirds on Chickaloon Flats on the south side of Turnagain Arm. Here are a few pages from his daily journal describing his impressions of the sunny days in late May out on the Flats.

All packed up to head back to cabin. Plane due in a half hour. Five full days of fun in sun here. What a May. Clouds to south today, NE wind.

Bloomed Paper Birch trees bundle up timber hillside like broccoli bunches, blended in pine green black spruce and hemlock, tundra gravel and thin snow-stripped peaks, half-leafed aspen trees lime sheen in between; so summer ascends into its verdure overture.

At this site we traded less birds for more beauty—Kenai Mountains proximity, panoramic pink sunsets, fast-flowing fresh creek. Took two dips. The frigid water zaps your breath away. Froze foot to nose, than sat in sun, slight breeze, regulated, ah.

We did a survey yesterday morning. Walked three transects guided by GPS. Didn't see much. Couple clouds of pectoral sandpipers—swaying swarms like schools of fish, dip tilt twitch drift, flash white bellies brown backs. Toward shore heard a train horn hoot and then optic-aided viewed a van vrooming along Turnagain Arm below bluff houses. I felt thankful to be out here on mud cake rather than in any auto.

17 days in I've missed way less about town life than I thought I would. I don't miss checking the internet, watching TV, making small talk, or spending money. I do miss a comfy bed, and I'd trade rolled up dungarees for a real pillow. Otherwise… perhaps a beer in the evening after long days trudging.

I will miss being here once we get back—the birds, grassy mud open country, getting a tan, returning to camp in the evening feeling exhausted and like a good help, wiped-out deep sleep, freedom, wandering around birding with a wandering mind.

Between walking to the next survey or mud collection point, there's a lot of time to think. I've tried to make use of it. Besides building new material for my book, I've enjoyed excavating my memory. At first I'd draw up choice topics: forgotten faces of pupils in elementary school classes, pro playoff games attended, JV soccer goals scored, part time jobs, vegetables my mom grew in her garden…

Eventually my mind got loose and it would mine memories on its own. I'd find myself reconstructing my grandparents' Brooklyn apartment in remarkable detail (red shag carpets, gilded faucet fixtures and photo frames, the hutch drawer with dice, decks of cards and a scrabble board); or in a cruise ship cocktail lounge (round pink chairs, fake plants, sea window) playing pitch with my brother and two friends; or vacationing with my family in Bar Harbor Maine or the Cape eating a seafood dinner then strolling the tourist town at twilight (barrels of salt-water taffy, buckets of creamy ice cream); or playing pickleball with friends in Florida, in the background a flock of white ibis and a sunning anhinga statuette.

Back on the plot later that afternoon we set up the scope on the one 80m X 800m band of best habitat (green, marshy ponds) and recorded time budget activity for three shorebird species. We'd eyeball one pectoral sandpiper, lesser yellowlegs or red necked phalarope and note its activity every ten seconds until it moved out of view. Individuals foraged, walked, roosted, preened or were alert for up to twelve minutes. A lot of this scientific work seems tedious to me but the idea is that it adds up to useful data. Learning more about bird behavior was useful to me.

The red necked phalaropes, a new chickaloon species for me, shuttle skip skid and spin like bath toy boats. They'll let you creep pretty close, unlike both greater and lesser yellowlegs which bob their neck alertly and sound a digitized-like alarm when you step within 15 yards.

The northern shoveler drake is decoylike with its green bill, yellow eyes and crisply drawn patches of rust and white and like most female ducks, the hen's beauty—checkered gray plumage, orangey yellow big bill—is underrated.

Sadie found a sandhill crane nest on a crafted marsh-grass island—two spotty eggs, dinosaur-ish and bigger than baseballs.

Snacking along the marshy timber edge we saw a moose, a brown bear and four black bears—coats sheeny as the oily feathers of a raven carving in sunlight.

Photo of Chickaloon Flats Sandhill Crane eggs.
Photo Credit: Sean Ulman

For raptors here we only saw bald eagle and male and female Northern Harrier. But I saw Whimbrel every day. For new birds we picked up Lincoln's sparrow and live-sided flycatcher by its call ('quick three beers') and hermit thrush, which called often and is currently and sounds like a spell being cast or the magic flute in Nintendo's "Zelda."

I like adding species by sounds and listening to bird songs and calls in general. It involves imagination akin to listening to a ballgame on the radio. I picture the bird flitting to the next branch with one flap or perched in the forest in a shaft of light, beak agape.

"The shift is on for the lefty slugger and here's the pitch—crack."

Violet green swallows swang around camp by the dozen, twittering sweet whistles like fluttery whispering faeries.

"That ball was absolutely whacked. The centerfielder is tracking back."

My friend phones. Big Papi, my favorite hitter, finally hit his first homer of the season last night.

A sound like the phone ringing again, from far off in the forest though, or the slice of a sword being sharpened or electricity or, the varied thrush! A long buzz song from a bird we hear daily but still haven't seen.

"Back, way back, get up, get outta here, that ball is…"

An aerial motor sawing sky, machinelike chopping chugging.

Hey, our plane is here. Right on time.

Sean Ulman received his MFA degree in creative writing from the Stonecoast program at the University of Southern Maine. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

I found a baby bird! Now what? Knowing when to help and when to stay away

by Liz Jozwiak

It's that time of the year when the Kenai National Wildlife Refuge starts receiving calls from the public about injured or abandoned baby birds and nestlings.

Most songbirds such as the warblers, juncos, thrushes, and sparrows arrive on the Kenai Peninsula to breed by late May to early June. Flycatchers and pewees arrive a few weeks later. These songbirds are also known as "neo-tropical migrants" because they winter as far south as Central and South America, and migrate to Alaska to breed. All songbirds are born helpless, as are woodpeckers, hawks, owls, crows and ravens. Their eyes are usually still closed, and they have few or no feathers. They are completely dependent upon their parents for warmth and nourishment. Waterfowl and grouse-type birds, on the other hand, are usually feathered and able to feed themselves within a few days after hatching.

It is our human nature to help a baby bird which looks as though it has fallen out of a nest. The chick was either trying to leave the nest prematurely, may have fallen out, or was learning to fly. In some cases our help is appropriate, in other cases it is not.

If you spot an animal, particularly a young or juvenile animal that appears to be deserted or in difficulty, do not catch it right away. Take 20 minutes or so to observe its behavior. Try to locate its nest. It should be close by. Look in heavy brush, hollow tree branches, and in shrubbery. Some birds such as juncos and robins are ground nesters, so the nest may not be in a tree, but on the ground or in shrubs.

In the case of a young or juvenile animal, it may simply be waiting for a parent to return. Remember, adult animals will often leave their young to hunt for food and return within a short period of time to feed/care for the offspring. Don't worry if you only see one parent. A single parent can raise the young alone.

If you believe the animal is injured, call the Kenai National Wildlife Refuge at 262-7021 or 252-0349 BEFORE you pick up the animal.

Injured or baby birds need special handling. Keep an eye on its whereabouts and describe its condition to the biologist or bird rehabilitator you reach on the phone. They will give you the proper course of action to take for that particular animal.

Even if you find another nest of the same species with nestlings in it, you may be instructed to put the baby there. This is especially successful for swallows, or if the baby is still naked and blind. If the baby bird seems warm and active, put it back in the nest immediately.

Don't worry that because you have touched the chick its parents will abandon both it and the nest. The majority of birds do not have a highly developed sense of smell. They will not "smell" a human and reject the nestling if you replace it in the proper nest. The parent birds may abandon a nest that they are building if it is bothered, but they are not likely to abandon a nest once the eggs have hatched.

If you find a feathered baby bird that is not in a dangerous situation (away from dogs, cats, roadways), it is best to leave it alone. The parents are probably nearby and will take care of the baby. Several species of birds (i.e. jays, towhees, American robins) continue to care for their young and, in fact, finish the fledgling's education at ground level.

Many baby birds leave the nest before they are able to fly. The reason they do this is varied. It could be that the nest became too small to accommodate all the babies (they've been growing at a rapid speed) or because parasites have invaded the nest, or because they sense they have a better chance against predators being out of the nest, but mostly because the parents have coaxed them, one-by-one, out of the nest because they knew instinctively it was time for their babies to take their first flight!

The parents have not abandoned them; they are close by, watching and caring for these babies. They bring food to them throughout the day and within a short period of time (days) the babies are flying, not gracefully, but flying short distances and then they follow their parents who will show them the best sources of food and water.

The best thing to do is to leave the baby bird there.

If you have picked the chick up, bring it back to the exact area you found it and place it in or under a bush. The parents have, most likely, been frantically looking and calling for this lost baby. You can wait and watch for a few hours to make sure the baby bird is OK, but do this from as far away as possible so you don't frighten the parents who are waiting for a safe time to approach the baby bird. If after watching from a distance for several hours you cannot see the bird's parents, follow the previous instructions and call the Kenai National Wildlife Refuge.

The one exception is if a baby bird is in an obviously dangerous situation, like sitting in the middle of the road, then pick it up and place it in a nearby bush where parents will still find it easily.

If you have released a baby bird, or are watching one in your backyard, it is very important to restrain your dogs and cats, and keep them indoors at this time. The majority of calls we receive about injured birds is because a loose or roaming cat or dog captured or was harassing it, thus driving the fledging away from the nest, or separating it from the other babies in the nest.

If you find a baby duck, shorebird or grouse, try to locate the parents and the rest of the brood. Release the baby nearby and leave the area so that the adults and baby may find each other by calling. These babies are feathered and can feed themselves even if the parents do not find them right away.

The worst-case scenarios are where the parents have been injured or killed, the nest blown down or destroyed, leaving the baby injured, cold, or lethargic. In these situations you will need to contact a licensed wildlife rehabilitator who specializes in baby songbird care.

Remember, most species of birds are federally protected and therefore it is not legal to keep them unless you are licensed to do so. Beyond the legalities, these animals require specialized care and diets to grow up healthy and strong. It's important to turn them over to an experienced person as soon as possible.

If you are thinking of trying to raise a baby bird yourself, here's what you will be in for:

- nestling must be fed every 14¬20 minutes from sunrise to sunset
- an adult robin makes about 400 trips every day to feed its young
- if the nestling is a few days old, it will take several weeks before it can be released
- adult birds teach their young where to look for food and how to avoid predators—things impossible for humans to do.

In Alaska, as in most states, wild bird rehabilitation is governed by the U.S. Fish and Wildlife Service. Most large communities have established wildlife rehabilitation centers such as the Bird Treatment and Learning Center (BIRD TLC) in Anchorage at (907) 562-4852.

The Kenai National Wildlife Refuge has filled this niche locally with the help of a team of baby bird network volunteers. I'm one of the federally licensed bird rehabilitators on staff who trains and works with a few very dedicated private citizens with extensive training in the Soldotna/Kenai area who are legally permitted to provide home care to baby birds that cannot be returned back to the wild.

While the Kenai National Wildlife Refuge is fortunate to have a small network of experienced baby bird rehabilitators, humans nevertheless make poor substitutes for bird parents. If you happen across a small ball of feathers learning to fly, resist the temptation to rescue it. Its parents are probably not too far away.

Elizabeth Jozwiak is a wildlife biologist and federally licensed bird rehabilitator at the Kenai National Wildlife Refuge. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Guided opportunities on Kenai National Wildlife Refuge

by Rick Johnston

Fishing with a drift boat guide in the Kenai River Canyon, Kenai National Wildlife Refuge.
Photo Credit: Rick Johnston

With frequent reporting of challenging conditions facing the United States economy, it should come as no surprise to Kenai Peninsula residents that tourism and travel may be considerably off for the 2009 visitor season.

According to many reports, various sectors of Alaska business have been less affected than the "Lower48;" however, it is becoming clear that Kenai Peninsula visitation and guided bookings have been affected.

A majority of guided trips come from out-of-state and out-of-area visitors. Out-of-state and international travelers to the Kenai Peninsula have been steadily increasing in recent years.

As part of my job with the Kenai National Wildlife Refuge, I am in charge of issuing special-use permits for commercial visitor services. Persons who conduct visitor services on the Refuge are required to obtain a permit and meet specific requirements for licensing, skill, liability insurance, and safety. Some guide services are limited and are awarded by competitive proposals. The high skill level of guides competing for certain guide areas presents me with some tough choices among first-class contenders.

Considering the contribution to Refuge recreation opportunities and the local economy, it is unfortunate that new guides and even long-time guides will be in for a difficult year. New guide applications were fewer this spring with many new guides deciding to delay start-up proposals. Although annual turnover is common, 2009 seems to stand out with significantly fewer proposals. Refuge guide permits are four percent fewer for 2009, a trend counter to an overall twenty eight percent increase between 2000 and 2008.

Many Kenai NWR guides also obtain sportfishing guide permits from Alaska State Parks due to the cooperative programs associated with the Kenai River.

According to Pam Russell, who is a Natural Resources Specialist for the Kenai River Special Management Area, bookings are off 30 to 40% for Kenai River guides. Newer guides have reported an even greater drop in business with a drop in referrals.

A school group being guided on complimentary Upper Kenai River float trip.
Photo Credit: Rick Johnston

Ms. Russell reported that only 290 sport fishing guides have obtained permits so far in 2009, down from 380 in 2008. She also said that some long-time guided sport fishing businesses appeared to be downsizing their number of assistants because of fewer bookings.

There may be a silver lining for Kenai Peninsula residents in the booking slowdown. An increasing number of guides are reportedly offering incentives for June and August bookings. Some guides are even offering reduced prices or 2-for-1 client trips. This type of marketing strategy may assist with their economic survival while encouraging local residents to

book a guided Refuge trip with their favorite guide. Local residents can throw these local guide businesses an economic lifeline while having a great Refuge experience. By enlisting the services of a guide for friends and family this season, local residents could take advantage of a great value while experiencing a new activity. Or perhaps there is that dad out there who would just like to take a break from "skipper duty."

Although I own two power boats, a canoe and raft, and have been fishing Refuge waters for over thirty years, I would say that there is nothing quite like getting to sit back and experience a guided trip… particularly when you are the one who has been the "captain" on the family outings.

Going on a guided trip with a Refuge guide can also refresh your local fishing and equipment knowledge, or even give you new material for fish stories or tall tales. It may be difficult when you fish only a few days a month to keep up to date on fish movements and daily hot spots. Tapping the knowledge, equipment techniques, and savvy of a guide can be a really a smart choice for experienced fisherman and a relatively inexpensive lesson for a new one.

Guides on the Kenai have come along way from simply being good fishermen to being well-rounded guides for visitors seeking information and quality outdoor recreation. In the past more than a few guides knew little about the Kenai Peninsula and even less about the Kenai National Wildlife Refuge.

I recall going on a Deep Creek halibut charter with a guide before the tractor concessions were instituted. He was experimenting with a technique using two Chevy Suburbans to launch a twenty six foot boat at Deep Creek beach. We had a large party and needed a larger boat. He was an OK fishing guide though lacking in other areas. He knew little local information or place names and was unable to identify Mount Redoubt for my inquiring mother.

Fortunately, the knowledge and experience of Kenai guides as a group has increased dramatically over the years. However, there is no substitute for asking questions and seeking references before settling on a guide.

Collectively, I have been impressed with the natural history, wildlife and fisheries, refuge, and human history knowledge, as well as old fashion story telling acumen of many of our Refuge guides. In two separate competitive offerings over the previous two years, both successful and unsuccessful proposals were literally bulging with experienced resumes concerning all of these subjects. I loved it that after 30 years on the Kenai, I was still learning something new while reading each guide proposal.

Some Refuge opportunities such as a guided Upper Kenai River canyon float or a drift sport fishing trip are occasions that even the most avid Kenai Peninsula outdoorsman and fisherman seldom experience. It may be far less expensive, safer, and simply more fun to book one of our refuge guides for a canyon trip than to purchase, maintain, and successfully use a drift boat or raft, outboard kicker, etc. for a few times a year. And given that many Lower-48 vacationers who won't be visiting Alaska this year, perhaps 2009 is a good time for local Kenai Peninsula residents to vacation close to home.

And don't forget Father's Day is coming up, (hint)….and I would love to sit back this year and be treated to a hassle-free guided trip on the Kenai NWR.

If you would like information about guided visitor service opportunities, regulations, or other recreational opportunities contact the Kenai National Wildlife Refuge Headquarters at 262-7021 for information.

Rick Johnston is a Ranger/Permit Specialist at the Kenai National Wildlife Refuge. He has worked on the Kenai National Wildlife Refuge since 1979. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

A rose is a rose unless it's a dandelion

by John Morton

Horned dandelion from the herbarium collection at the Kenai National Wildlife Refuge. The specimen was collected by Dave Klein in 1951 along the shore of Skilak Lake when he was a graduate student working on the Kenai National Moose Range. Klein subsequently became a prominent wildlife biologist at the University of Alaska – Fairbanks. Note the clasping, horned bracts below yellow flower head.
Photo Credit: Matt Bowser

My family hiked up Hideout Trail over Memorial Day. It's a favorite with my kids because it quickly gets us above treeline, giving us great views of the upper Kenai River and access to good berry picking later in the summer. Mostly purple and white wildflowers lined the trail: wild geranium, dwarf Jacob's ladder, lupine, violets, Draba mustard, chickweed, high bush cranberry, star flower, and bunchberry. The only yellow flowers at this time of year are Indian paintbrush and the common dandelion.

I was a little disappointed to see the common dandelion being what its namesake suggests–so common. The yellow on both sides of the trail show how our boots help disperse seeds. However, the tale-tell growth in undisturbed alpine meadows and burned areas also indicates that wind is dispersing it beyond the trail's margin and human influence.

It's simply more evidence that some of the 110 or so exotic plant species known on the Kenai Peninsula really are becoming truly invasive. Just three years ago, a group of volunteers from the Friends of Alaska Refuges picked several garbage bags full of dandelions along this trail in an effort to slow its spread, but apparently with no long-term success.

The common dandelion, *Taraxacum officianale*, is a European species that was first introduced to the New World in the 1600s, and is now widely distributed over the U.S. In French, dandelion means "tooth of the lion" in reference to the leaf shape. It was almost certainly planted by colonists because dandelions can be used to make dandelion wine, salad greens, and a kind of coffee. The leaves are high in vitamin A, vitamin C, and iron, with more iron and calcium than spinach!

Unfortunately, Common dandelion is a highly invasive plant in the western hemisphere, rapidly colonizing disturbed soils. It often comes in after fires, both from wind-blown seeds and germination from the existing seed bank. Seeds can remain viable in the seed bank for many years, germinating after nine years in one study. This species is a prolific seed producer, with 54 to 172 seeds produced per head, a single plant can produce more than 5,000 seeds a year. Almost a billion seeds could be produced annually by a dense stand of dandelions on a single hectare! And when released, the seeds can be spread by the wind up to several hundred meters from their source.

But did you know that we have a native dandelion that is actually quite rare on the Kenai Peninsula? The

native horned dandelion (*Taraxacum ceratophorum*) is so closely related to the common dandelion that some taxonomists consider it a subspecies. Both *Taraxacum* species produce a basal rosette of leaves anchored by a thick taproot. Although they have similar flowers, *T. ceratophorum* has clasping, horned bracts (phyllaries) at the base of the yellow flower head as opposed to hornless reflexed bracts on the common dandelion. Insect pollinators move indiscriminately between both species which flower from mid-June to August.

It's thought that *Taraxacum* originally evolved in Asia, but fossil evidence indicates that the Horned dandelion was in Alaska at least 100,000 years ago. Horned dandelions have been documented on the refuge only twice. One was found somewhere on Skilak Lake, recorded as "campsite, rocky lake shore" on the herbarium label from 1951. The other was collected in 2007 from a nunatak poking through the Harding Icefield. Hulten's *Flora of Alaska* shows two other records, both from the area between Kenai and Nikiski.

We know these two dandelion species hybridize in the wild. So why is the exotic species invasive but the native species apparently not? And how is the native species continuing to persist despite the rapid spread of common dandelions?

Marcus Brock and his colleagues at the University of Missouri have studied what makes these two species different. Horned dandelion populations are composed of diploid plants, and intraspecific crosses confirm that this species has an obligately outcrossing breeding system (i.e., it can't self-pollinate). Hand-pollination of horned dandelion stigmas, using pollen from common dandelions, produces viable hybrids. Importantly, common dandelion can produce fertile seeds in the absence of pollination; such seeds are genetically identical clones. And because common dandelion seeds are smaller than the horned dandelion's, models predict greater dispersal of the exotic species within both open and vegetated habitats.

The researchers also found that common dandelions produce larger leaves, and taller and more canalized seed-bearing stalks, than horned dandelions under different light intensities. Common dandelions have greater above-ground surface area and a greater capacity to extract water from the soil, which are great characteristics when environmental conditions are relatively good.

However, horned dandelions appear to be better adapted to drought conditions. They have thicker leaves and use water more efficiently (carbon gained/water lost) than common dandelions or hybrids. After six days of greenhouse drought, photosynthesis and transpiration were reduced in common Dandelions compared to horned dandelions.

The characteristics of common dandelions may confer growth advantages in moderate (mesic) environments. However, as water becomes limiting such as during drought or in alpine habitats, native dandelions should be favored. These researchers caution, however, that other changes in environmental conditions, such as increasing atmospheric CO_2 in a climate changing world, could alleviate the severity of water limitation to photosynthesis and favor the continued spread of common dandelions.

There are two take-home messages. Shakespeare wrote that a rose is a rose by any other name, but native and exotic dandelions really are different regardless of their similar appearance. And the exotic dandelion really does pose a threat to our Alaskan native plant. So while I encourage you to pull Common dandelions whenever you can, make sure you've got the right species when you're traveling in the back country. Stop by the refuge if you want to better understand how to identify our native horned dandelion.

John Morton is the Supervisory Fish & Wildlife Biologist at the Kenai National Wildlife Refuge. He is also adjunct faculty at the University of Alaska Fairbanks and Colorado State University. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Jigsaw Lake: New studies lend further evidence of very dry times 8-10,000 years ago

by Ed Berg

Prof. Tom Lowell (l) and students Terry Workman and Alena Giesche take a sediment core in Jigsaw Lake. The core drill extends down through a hole in the plywood platform strapped onto two canoes. The core drill is pushed into the soft sediments by pulling on a rope whose force is multiplied by several sets of pulleys.
Photo Credit: Ed Berg

In a 2001 Refuge Notebook, I described a study of lake sediments at Jigsaw Lake which indicated that the lake level was roughly 40 feet lower about 8-10000 years ago. This was a very surprising discovery. The central Kenai would have to be very dry to lower any lake by 40 feet.

We are now revisiting Jigsaw Lake with some new technology that should allow us to reconstruct the history of this remarkable lake since the end of the last ice age.

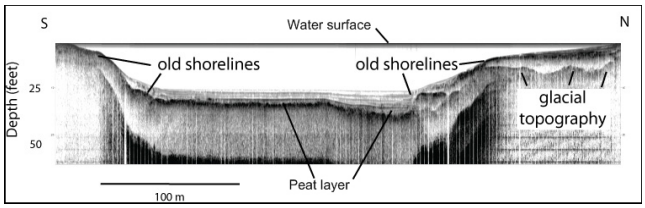
Jigsaw Lake is located at the end of Swan Lake Road, 17 miles northeast of Sterling. Like most lakes on the Kenai, Jigsaw Lake is a kettle lake. It began life as a block of glacial ice imbedded in sands and gravels derived from the melting ice sheet that had flowed out across the Kenai Lowlands from the Kenai Mountains. This ice sheet did not pull back like modern valley glaciers, but simply fell apart with the rapid warming that started after the last glacial maximum 23,000 years ago. By 19,000 years ago the area from Sterling west to Cook Inlet was mostly ice-free. There would be a three more shorter and shorter re-advances of the glacier ice sheet during the next 5000 years, but they would not reach as far as Sterling and Jigsaw Lake.

Jigsaw Lake is a closed-basin (no outlet) lake with a small watershed perched on the drainage divide between the Moose River to the south and the Swanson River to the north. Because it has no streams for input, the lake is fed entirely by local precipitation via groundwater and spring snowmelt. This relatively "high and dry" position above the regional water table means that the lake level is very sensitive to the local climate, especially to changes in precipitation. Lakes downslope in the regional drainage have the groundwater table above them (upstream, so to speak) which acts like a buffering reservoir to keep their lake water levels relatively constant, whereas Jigsaw Lake has no such buffer. Indeed, the exposed shore apron around the lake indicates that the water level has fallen several feet in the last decade or so, with drier and warmer summers.

During June a team of geologists has been making seismic profiles of Jigsaw Lake and taking many sediment core samples. The seismic profile equipment is mounted on a canoe; it is basically like a high-class fish finder, bouncing sound waves off the lake bottom and sediment layers. The seismic profile shows two distinct buried shorelines that were formed when the water was roughly 28 feet and five feet lower.

The most remarkable story however comes from the lake sediment cores, which reveal that the lake basin was once dry enough to be a muskeg that accumulated one to two feet of peat. The bottom of the peat layer varies from six to 45 feet below the present water level, indicating that water was down at least 45 feet when the muskeg plants (mostly brown mosses and Sphagnum peat moss) were growing. A radiocarbon date on the bottom of this peat in the 2001 study yielded a date of 9550 years (calibrated). We will get more radiocarbon dates, both at the top and bottom of the peat layer in different cores to estimate how

long the water level was low enough to grow terrestrial vegetation.



A seismic profile of the east lobe of Jigsaw Lake shows a flat-bottomed basin about 25 feet deep. Sediment core drilling shows one or more layers of lake sediments (mud) on top of a one to two foot thick peat layer. The peat lies on top of well-sorted glacial sand that probably washed into the original kettle hole left by a melting block of glacial ice.
Photo Credit: Tom Lowell

The lower buried shoreline—at 28 feet down—was formed after the muskeg flooded and lake sediments were being laid down. Hopefully we can find organic materials in the lake sediments which will give us a date on the time when the lower shoreline was eroding and shedding sediments into the basin.

Curiously, we also see an old wave-cut shoreline running around the lake at a height of about eight feet above the present water level. It is back in the woods and only noticeable when you are entering or leaving the lake basin. This steep scarp represents the highest water level or wettest period in the history of the lake. Erosion features like this are inherently difficult to date because the evidence has been removed, not deposited.

Because the scarp is steep we infer that the period of erosion lasted a long time. The eroded soil pretty well had to go into the lake basin, unless it was blown away, which seems unlikely. Radiocarbon dates on sticks and other organic materials in the lake sediments may provide evidence for the timing of the scarp erosion.

In the final week of the study the geologists profiled and cored the southern basin of the lake, which became detached as a separate lake when the water level fell in the 1990s. This basin also has a peat layer buried beneath lake sediments, indicating that the water level was similarly drawn down many feet below the modern lake level, presumably at the same time as in the main basin, which we will confirm with additional radiocarbon dates.

Prof. Greg Wiles from the College of Wooster, Ohio and Prof. Tom Lowell from the University of Cincinnati are leading the geology crew, assisted by undergraduates Alena Giesche from Middlebury College in Vermont, Terry Workman from Wooster, and Jessa Moser from U-Cincinnati. Funding is from the National Science Foundation through the Keck Geology Consortium and the U.S. Fish & Wildlife Service.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Sudden uplift of the beach recalls ancient landslides

by Ed Berg

View of the uplifted beach floor with barnacles and dried algae on rocks, looking northwest toward Mt Iliamna. Photo Credit: USFWS/Ed Berg

Sometime during the night of July 2-3 a geologic uplift several hundred yards long appeared on the beach southeast of Diamond Creek, between Homer and Anchor Point. The lower intertidal zone rose up as much 15 feet, in three elongate mounds. Deep cracks as much as a yard wide ran along axis of the uplift. When I visited the site two days later I could see well-dried algae on the uplifted rocks that indicated that recent tides had not covered them.

Local resident Ken Hahn noticed the uplift early Friday morning, July 3. He climbed up on top and observed that the algae was still wet, which indicated that the algae had not been exposed the previous day and hence that the uplift occurred during the night. The USGS website reported a magnitude 1.9 earthquake at 0754am six miles NW of Ninilchik, and a magnitude 2.1 earthquake 20 mile ENE of Nikiski at 0606am.

My first impression was that this uplift represented a tectonic event, albeit a small one, compared to the uplifts associated with the 1964 earthquake, for example. The reported earthquakes however were pretty minuscule for an event that apparently shifted bedrock to the surface.

The uplift lies roughly parallel with the bluff, but 50-100 yards out from it. There are old slump and slide deposits at the base of the bluff, and the huge mile-wide Bluff Point slide lies about a half mile further down the coast toward Homer. (The Bluff Point slide forms the large valley on the north side of Baycrest Overlook on the Sterling Highway above Homer).

Could this uplift on the beach somehow be related to old landslides? At the north end of the uplift I could see that the bedrock strata underlying the beach deposits were tipped almost vertically, dipping steeply to the SW, whereas in the exposed bluff face the strata were more or less horizontal. I wondered if I might not be standing on an old slump block that had been beveled off by wave action over a long period of time.

I was also puzzled by the fact that the uplift cut across the regional tectonic trend in the Cook Inlet basin. Our area is under compression on a NW-SE axis because the Pacific Plate is diving under the Kenai Peninsula-Cook Inlet basin in a NW direction. This regional squeeze causes ripples of uplifts and downwarps that run in SW-NE direction, perpendicular to the compression. The new uplift however cuts almost perpendicularly across this regional grain, which would be most odd for a tectonic feature.

I discussed these observations with geologist Bretwood "Hig" Higman of Seldovia, who suggested that the uplift is a reactivation of an old landslide, probably associated with the Bluff Point slide. The slide could have occurred as long as 17,500 years ago when the ice of the Killey-age glacial advance pulled back into Kachemak Bay from the Bluff Point area. The fact that strata of the local bedrock (Beluga Formation) under the uplift were steeply dipping to the southwest suggested that this bedrock was part of a large slide block that had rotated upward and indeed was slightly overturned.

In slope failures it is often the case that a large block slides down a rupture plane which is concave upward. The leading edge of the block rotates upward, and the block moves outward and away from slope from whence it launched. If the strata in the bedrock were initially horizontal, they now dip back toward the slope. You can see this in the Bluff Point slide, where the strata along the beach dip inward toward the bluff, and ponds occupy the void left behind when these strata slid out to their present location at the top of the beach.

View of the uplift from the south side. The lower intertidal zone has been uplifted about 15 feet. Note that the ocean side presents a steeper face than the landward side, suggesting an upward, clockwise rotation. Photo Credit: USFWS/Ed Berg

Add to this story thousands of years of shore erosion and a few hundred meters of bluff retreat, and you have created a normal looking, gently sloping beach on top of a beveled off slide block. Someday, for some reason, the slide block moves and rotates downward a bit more, forcing the leading edge upward, and viola!, we have an uplift out on the beach. Hig observed in my photos that the seaward edge of the uplift was steeper than the landward edge. This is exactly what one would expect with a rotating block.

Soldotna geologist Dick Reger pointed out that erosion of a slump block, especially on the beach, changes the distribution of stresses in the block. Material is removed from the bottom (beach) side and material can be deposited as colluvium (slopewash, landslides, etc) on the top side, both of which would tend to make the slide block continue its rotation. He noted that highway construction sometimes reactivates landslides up in the Interior by making a roadcut through the toe of a slide, analogous to beach erosion in our case.

Dick Reger wrote the original paper on the Bluff Point slide in 1979 and concurred that the present uplift is a reactivation of an old slump block. He said that it is possible that there have been many such uplifts along the coast, all of which have been beveled off by thousands of years of very active beach erosion. He too had seen steeply dipping strata in front of the Bluff Point slide, and interpreted this as a beveled off slide block.

There doesn't seem to be any obvious explanation why the uplift occurred at this time. Hig pointed out that this summer has been dry, so pore pressure of water in the rocks would not be high. Slope failures are often facilitated by water-logged bedrock, as with the famous 1967 Grewingk Glacier slide which occurred during one of the wettest Octobers on record. The uplift is located at 59.6585°N, 151.6764°W for those who would like to view the location on Google Earth or use their GPS to check it out on the ground.

I would like to thank Hig Higman, Dick Reger, Ken Hahn, Laurie Daniel, and Charlie Stock for information and ideas for this article.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Ed will be teaching his 5-week 1-credit "Geology of Kachemak Bay" course at the Kenai Peninsula College in Soldotna and Homer, beginning Sept 8 and 10, respectively. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Shantatalik Creek Fire bodes well for wildlife

by Ed Berg

Ten years of birch growth in the 1994 Windy Point burn in a photo from August 2004. The thick birch regeneration in this burn area attracts many moose in the winter. Former Kenai Refuge Biotech Doug Fisher (l) and the author are in the foreground, with Tustumena Lake and Tustumena Glacier in the background. Photo Credit: Matt Bowser

It's fire time once again on the Kenai. There is smoke in the air and the sound of whirring helicopters. The Shantatalik Creek Fire has burned approximately 14,000 acres since starting from a lightning strike on June 29th.

Fire is a vital part of the forest cycle on the Kenai. Spruce bark beetles are the primary disturbance agent in the upland white spruce forests, and fire is the most effective way to prepare a seedbed for restarting the forest cycle after a period of heavy beetle kill, such as we experienced in the 1990s.

Our fire history studies indicate that the area north of Tustumena Lake, including Shantatalik Creek, burned in the 1870s. Trapper Andrew Berg, who lived on Tustumena Lake from 1891 until his death in 1939 believed that there had been burns in 1871, 1891 and a partial re-burn in 1910. He reported that the 1910 re-burn removed much of the dead and down wood from the previous burns and made the country easily accessible to moose. These fires produced abundant willow browse and ultimately attracted international hunters seeking the "Giant Kenai Moose" in the period of 1898 through the 1920s.

We know the spruce bark beetles hit the area lightly in the 1970s and then heavily starting in 1992.

The present fire is a mid-season fire during a dry summer, so there will likely be good consumption of the organic layer and bare mineral soil will be exposed, at least in patches. There is plenty of down spruce on the ground that could burn for days, further consuming the organic layer.

Bare mineral soil provides the best seedbed for seed germination and seedling establishment. We like to see fires that are rated "severe" in terms of their fuel consumption, because these fires quickly promote new hardwood browse for moose and hares, as well as providing a nursery for spruce seedlings, which grow more slowly than hardwoods like birch, aspen, cottonwood, and willow.

The most productive areas for wildlife on the Refuge are the areas that have been most severely burned. The large (79,000 acre) 1969 Swanson River Burn northwest of Sterling, for example, re-grew with profuse birch browse and has been a favorite moose hunting area since the 1970s. By now however much of the birch has grown too tall to be browsed effectively by moose and certainly by hares.

Currently, the 1987 prescribed burn in Skilak Loop and the 1994 Windy Point burn on the southwest end of Tustumena Lake are severe burn areas that have dense "dog hair" birch regeneration and abundant moose herds in the winter. The somewhat older 1974 Pipeline Road burn in the Mystery Creek–Chickaloon River area is a similar young birch forest on a severe burn with abundant winter moose.

On the opposite end of the burn severity scale, we have the early season grass-fed fires which typically kill the trees but don't consume the organic mat because it is too wet or frozen. The 1994 Crooked Creek burn southwest of Tustumena Lake, for example, occurred in early June and had mineral soil exposure of only 1-2%. Much of the burn regenerated as thick bluejoint (*Calamagrostis*) grass, some of which torched in the June 2007 Caribou Hills Fire east of Ninilchik, another early season burn with poor mineral soil exposure. These flashy early season fires are basically an

ecological waste, because they produce little browse for the moose and hares, little spruce regeneration, and lots of grass for future early season fires.

Early season grass fires are typically a legacy of logging, because removal of the trees opens up the ground to sunlight. Bluejoint grass is usually always present on the forest floor, but in small amounts above ground, whereas its rhizomes (underground stems) are everywhere, and generate new above-ground shoots as soon as sunlight arrives.

Bluejoint grass is slow to establish from seeds on bare mineral soil, so it can't out-compete birch and other hardwoods after a severe mineral soil exposing fire. Logging however doesn't disturb the rhizomes, so bluejoint grass soon converts logged areas into grassy savannas. The sunlit grass forms a dense sod which lowers soil temperatures and inhibits seedling germination.

Before European settlement there were probably no grassy savannas on the Kenai. Grass is always a minor component in our pollen profiles from lake sediment cores, which record as much as 13,000 years of postglacial vegetation history. The dense white/Lutz spruce forests of the southern Kenai burned only every 400 to 600 years, according to our fire history studies. On average, the mixed spruce and hardwood forests of the central Kenai burned every 130 years, whereas spruce bark beetles thinned these stands every 50 years. White/Lutz and Sitka spruce in the pre-Settlement era regenerated mostly on rotten nurse logs, as shown by the stilted roots of older trees. When these species germinate on mineral soil they extend their roots straight out, perpendicular to the trunk, as can be seen in the many post-Settlement burn areas on the Kenai.

With land clearing and logging, bluejoint grass has flourished, so we now have grassy savannas and flashy grass fires as another expression of the human footprint on the landscape.

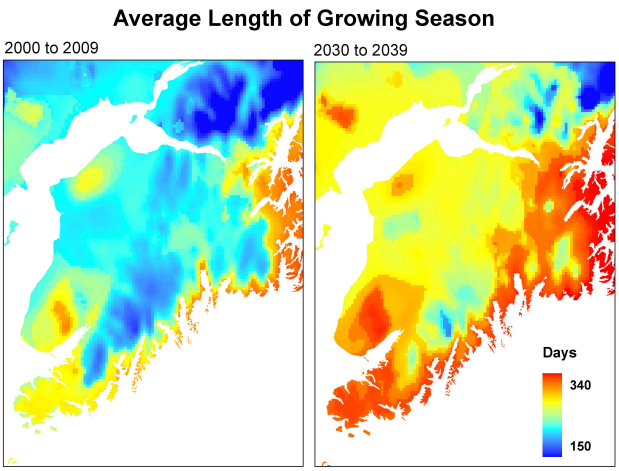
The Shantatalik Creek fire is, blessedly, an example of the older style of pre-Settlement fire, unsupported by grassy savannas. It will likely create a mosaic pattern, consisting of hardwoods in the more severely burned patches, spruce in the more lightly burned areas, with some muskeg pockets remaining more or less unchanged in the wet areas.

The fire is burning in an area classified as "Wilderness" and "Limited" fire suppression. Firefighters have successfully used direct attack on the western and northwestern flanks to limit the possibility of the fire moving off the Refuge toward human habitation. If the fire burns east to Benchlands and/or south to Tustumena Lake, we would welcome this as an opportunity to rejuvenate a lot of beetle-killed forest which would reduce the risk of a future, more dangerous fire under drier and windier conditions.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Ed will be teaching his 5-week 1-credit "Geology of Kachemak Bay" course at the Kenai Peninsula College in Soldotna and Homer, beginning Sept 8 and 10, respectively. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Mapping the future

by Dawn Robin Magness



On the Kenai National Wildlife Refuge, we are using forecasts to think about how ecosystems and species distributions might change in the future.

Last month, the House of Representatives narrowly passed a climate change bill. If enacted by the Senate, the bill will seek to reduce greenhouse emissions from current levels by 17% by 2020 and over 80% by 2050. Undoubtedly, there will be more lively debate about the costs, methods, and timeline of climate change mitigation.

Mitigation actions seek to reduce the magnitude and rate of climate change. Although mitigation is important to slow the pace of future change, Alaska is already experiencing climate change impacts. Alaska has warmed twice as fast than other regions of the United States over the past 50 years. A report by the U.S. Global Climate Change Research Program found average annual temperatures in Alaska have risen by 3.4°F and average winter temperatures have increased by a whopping 6.3°F.

Warmer winters might sound great when we think about the work we put into gathering and splitting firewood. However, these changes come with economic and ecological costs. For example, the shortened ice road season has a significant financial impact on oil and mining industries on the North Slope. Increased wildfire activity impacts infrastructure and human health. Wetland drying reduces or changes the locations for waterfowl breeding habitat and hunting opportunities.

On the Kenai Peninsula, documented climate change impacts have already begun. Closed-basin lakes are drying and changing the habitat available for waterfowl. Tree-line has risen, so less alpine habitat is available. The Harding Ice Field is shrinking and the increased silt and melt-water in Skilak Lake has reduced the plankton available for sockeye salmon fry to eat. In the 1990s, the largest spruce-beetle outbreak in the world occurred in south-central Alaska and is linked to higher summer temperatures and drought.

What can we do as mitigation efforts begin in Washington D.C.? In a word, we can adapt. Along with mitigation, adaptation is another tool for responding to climate change. Adaptation seeks to minimize negative effects and exploit any beneficial opportunities from climate change. Although we are beginning document climate change impacts on the Kenai Peninsula, planning for adaptation can be difficult because future conditions are uncertain. To reduce this uncertainty, climatologists use forecasts to try to estimate what changes are likely in the next 50 or 100 years.

What can we expect from climate forecasts? We don't have a crystal ball to know whether mitigation bills will pass and be effective in the United States, much less what other counties will do. To deal with a range of possibilities, forecasts use scenarios. Scenarios are storylines that describe very different future worlds. The Intergovernmental Panel on Climate Change, a scientific panel tasked to evaluate climate change risk, developed a widely used set of scenarios. To get a sense of the range possible future conditions, a scenario with accelerating greenhouse gas emissions can be compared to a scenario where emissions stabilize and then decline.

Scientists also need General Circulation Models (GCMs) for generating forecasts. GCMs use mathematical equations to simulate how climate is affected by interactions between the atmosphere, oceans, and the land surface. Scientists assess GCMs based on their ability to predict past climate conditions. GCMs are then used to forecast future climate conditions based the expected greenhouse gas emissions outlined in any given scenario. GCMs typically predict climate condi-

tions for 500km by 500km cells on the globe, which is a very coarse scale.

Working with colleagues at the University of Alaska, Dr. John Walsh has made the outputs of GCMs more useful for thinking about the future in places like the Kenai Peninsula. First, Dr. Walsh's team had to choose which GCMs to use. Many different GCMs have been developed by different research teams.

Different GCMs perform better than others depending on the region of interest, so Dr. Walsh's team evaluated 15 GCMs to compare how well they predicted actual temperature and precipitation for the years 1958 through 2000 in Alaska. They chose 5 of these models based on their performance and averaged their forecasts.

The next step was to "scale-down" the information from the 100km by 100km grid cells used in these GCMs to 2km by 2km cells that are more useful to land managers and communities. Dr. Walsh's team used weather station data, topographic maps, and local knowledge of climatologists to make these useful maps.

Managers and planners now have access to maps of Alaska that are forecasts of future climate conditions. The maps are available online from the Scenarios Network for Alaska Planning (SNAP). SNAP is a collaborative network of the University of Alaska, government agencies, and nonprofits. The mission of SNAP is to provide timely access to management-relevant scenarios of future conditions in Alaska.

As an example, I went to the SNAP website for data about the average days in the growing season on the Kenai Peninsula. I also downloaded a forecast of the growing season for 2030 to 2039. The forecast was based on the scenario where greenhouse gas emissions stabilize and then reduce. Even with effective mitigation of greenhouse gas emissions, we will likely experience a longer growing season in the future.

More days in the growing season is just one factor. We will likely see other changes like warmer temperatures, more variable temperatures, and changes in precipitation patterns. Thinking about these possibilities will allow us to experiment with and develop new opportunities. For example, some new crops may be possible with a longer growing season.

We all have experiences with weather forecasts from the evening news that are wrong. A sunny weather forecast can turn into a rainy day. However, forecasts are still useful for planning. We need these tools. They give us clues that can be used to look for changes and envision conditions that may be very different than what we see today.

Dawn Robin Magness is the GIS Manager and a Fish & Wildlife Biologist at the Kenai National Wildlife Refuge. She recently moved to Soldotna from Fairbanks where she completed her Ph.D. Her dissertation research focused on climate change adaptation strategies. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

The fight against pike

by Emily Smith

These two pike demontrate how they make a meal of juvenile salmon. A population of pike can easily wipe out a populaiton of juvenile salmon in a salmon-rearing body of water. Photo Credit: Alaska Department of Fish and Game

Since arriving from Tennessee about a month ago, I have learned a lot about some of the invasive species threatening the harmonious balance of Alaska's different ecosystems. In Tennessee, we have our own set of invasive species to deal with, but some, such as rainbow trout, have been around so long that most people don't think of them as invasive. Others, like the wooly adelgid—an insect that attacks and kills Eastern Hemlocks, were first introduced in New England but are so destructive that we have been helpless to stop their spread. In Alaska, I have noticed that people care a lot about protecting their land from invasive species, and have not given up hope that invasives can be stopped and removed.

One of the biggest threats to Southcentral Alaska's waters is the northern pike. I learned about it first from the many posters plastered around our office warning of the "voracious predator" threatening salmon. Once I began researching the northern pike, though, I realized that they do not play the role of villain everywhere. Other than Southcentral Alaska, northern pike can be found in almost every other part of Alaska, and what's more is that they are a valued sportfish in the places where they occur naturally. In places where they have co-evolved for thousands of years with other fish, pike are just another player in a balanced ecosystem.

However, when northern pike were illegally introduced to the Kenai Peninsula, some shallow and vegetated lakes where juvenile salmon and rainbow trout dwell became a fish buffet for the pike. In some lakes pike have become the only fish species left in the water. There are a number of now infamous pictures of pike preying on salmon or of pike caught with 8, 10 or 12 juvenile salmon in their stomach at one time. When pike are introduced into a lake which has been stocked, Alaska Department of Fish and Game (ADF&G) often discontinues stocking the lake because there are better ways to spend that money than on pike food, even if the waterway was once a popular salmon fishing spot.

Fishery organizations have been dealing with the introduction of northern pike on the Kenai Peninsula since the first ones were confirmed in Derks Lake in the mid-1970s. Derks Lake is part of the Soldotna Creek drainage, and from there pike naturally spread to other parts of the drainage. The spread of pike was aided by additional illegal introductions elsewhere. Currently, 16 Peninsula lakes have been confirmed with northern pike populations. Rainbow trout, Dolly Varden, Coho salmon, and stickleback populations once thrived in many lakes within the Soldotna Creek drainage, but have now all but been wiped out by the pike. Now though, Sevena Lake's population of native fish have begun to rebound thanks to the ADF&G control netting programs to reduce the number of pike in the lake.

Control netting is just one approach that ADF&G has taken to try and curb the pike problem. Arc Lake, located near Soldotna, was previously stocked with salmon by ADF&G until pike were discovered in 2000. In 2008, Arc Lake was treated with rotenone by ADF&G to eradicate the pike. Rotenone is a natural plant chemical which is commonly used as a piscicide, or fish killing agent. At first glance, a chemical killing agent may seem like an extreme measure, but other than draining a lake, which is costly and often impractical, it is the only way to totally get rid of an invasive fish. By making fish unable to use the oxygen absorbed in its blood, rotenone effectively kills

fish while leaving most non-gill breathing organisms unaffected, and it quickly breaks down into non-lethal compounds. Rotenone naturally degrades with warm temperatures and sunlight allowing waters to be restocked or colonized by desirable species.

In 2000, a Nikiski lake was chemically treated with rotenone to eradicate the yellow perch that had been illegally stocked there. The treatment successfully removed the perch and any threat of them becoming the second aquatic nuisance species predator to become established on the Peninsula.

In 2008, Arc Lake was the first lake on the Peninsula to be chemically treated as a means for pike removal, and its apparent success has enthused ADF&G to continue the eradication process. Plans are now in the works to treat two more lakes. Scout Lake just east of Soldotna and Sand Lake in Anchorage are both being considered. Chemical treatment is not something that is taken lightly, though. Part of the process for obtaining the authorizations to treat the lakes includes public commenting periods. There are two authorizations that both require public commenting periods. One is for the State of Alaska Department of Environmental Conservation Pesticide Use Permit Application that was submitted for each lake project. The second is for the Environmental Assessments (EA's) written for each lake project.

ADF&G encourages people to voice their concerns or to ask questions about these projects. The EA's can be viewed online at: http://www.sf.adfg.state.ak.us/Statewide/InvasiveSpecies/PDFs/SandLakeEA.pdf

For specific information regarding the Pesticide Use Applications, please contact the Alaska Department of Environmental Conservation Pesticide Use Program.

Communication is key in preventing further spread of pike on the Peninsula. People need to know that, along with being illegal, stocking pike can pose a serious threat to natural salmon populations, and ADF&G needs to know if pike are found in any new waters. This is why they promote the R&R policy of retain and report. If you catch a pike on the Peninsula, do not release it back into the water, and if it is from a place previously not thought to have pike in it, contact ADF&G because your catch information could prove valuable in the fight against this invasive species.

While efforts to reduce pike populations continue, the threat of pike spreading into areas where they could cause even more damage still exists. Kenai Fish and Wildlife Field Office's weir on Soldotna creek near where it feeds into the Kenai River has video confirmation of pike swimming from the creek towards the river. The Kenai River is not good pike habitat, but it could be used as a corridor for pike to move into the Moose River which would be devastating for this productive Coho rearing stream.

The Swanson River is another productive Coho stream threatened by the close proximity of pike. Stormy Lake which contains pike is connected to the river, so temporary net barriers have been placed across the connecting stream. A permanent barrier could be in the plans for the future; however, constructing a barrier that can block tiny larval pike is no easy task.

Despite the challenges, work to remove pike from the Peninsula will continue. Since increasing pike control efforts in 2001, ADF&G has made an impact on the pike population, and with continued efforts, removing or containing pike on the Peninsula may be an attainable goal. However, these goals can only be accomplished with the cooperation of the public. First of all, do not stock pike. If you catch pike on the Peninsula, keep them, and report any pike you catch in a new or suspicious place. If you have concerns about any pike removal plans, talk to ADF&G, they want to hear from the public. Finally, the 2009 Fishing Regulations have a list of lakes on the Peninsula where pike fishing has been liberalized, so if you feel like taking a direct approach to supporting the removal of pike, grab your fishing gear and have at it!

Emily Smith is the Environmental Education Intern at the Kenai Fish and Wildlife Field Office. A recent graduate of East Tennessee State University, Emily came to the Fish and Wildlife Service through an internship program with the Student Conservation Association in May 2009. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Monitoring Common Loons for contaminants on the Kenai National Wildlife Refuge

by Liz Jozwiak

For many North Americans, loons are a symbol of clean air, clean water, and the solitude of the deep-woods wilderness.

But about 30 years ago, people noticed shrinking numbers of the common loon in parts of northeastern North America. Researchers began capturing loons on their breeding lakes in Southeast Canada in the mid-1990s to study them and monitor reproduction, and discovered that loons in certain areas of North America had high levels of mercury in their blood and feathers.

Mercury is released as a gas from a variety of human caused sources (e.g., coal burning plants and municipal incinerators), and is carried in the atmosphere. Mercury is deposited on the landscape where it can be methylated and then bioaccumulate and biomagnify in a variety of aquatic environments.

Contamination is highest in water bodies with low acid neutralizing capacity, and fluctuating water levels. These situations are likely to enhance the conversion of elemental mercury to methyl mercury (the toxic form).

It is now believed that most the atmospheric mercury that is deposited in Alaska comes across the Pacific Ocean from Asia, especially from the numerous coal burning power plants in China. Alaska loons will thus have the capacity to serve as monitors of this "Asian plume" as China brings more coal-fired power plants online in future years.

Recent studies by the non-profit group BioDiversity Research Institute have revealed that mercury levels in lower 48 common loons generally increase from west to east across North America, with the highest levels occurring in birds breeding in New England and eastern Canada. This western to eastern increase over North America is thought to occur because of wind direction and the numerous coal-burning power plants emitting mercury in the atmosphere across the continent.

High levels of mercury are associated with behavioral changes in Common Loons that can lead to decreased productivity, decreased survival of juvenile loons, and may be related to increased susceptibility to other diseases.

Significant behavioral differences occur in immature loons with high mercury levels, including increased preening and decreased time spent riding on the parents' backs. These behavioral changes result in increased exposure to predators and increased energy expenditure, contributing to decreased survival of young loons.

Blood and feather mercury levels in loon chicks are a good indication of mercury levels obtained from prey items acquired almost entirely on the lake they hatched from. In contrast, adult blood mercury levels reflect recent dietary uptake, while feather mercury levels reflect mercury that has been acquired over their lifetime.

Loons can rid their bodies of mercury by depositing mercury in feathers and eggs. Thus, with every molt, and for females, with every egg laid, body burdens of mercury are decreased. However, through continued ingestion of fish with a high mercury content, loons accumulate mercury faster than they can rid their bodies of it. This is particularly true for male loons, since they lay no eggs and, because of their larger size, they tend to eat larger fish than females.

In Alaska, the Kenai National Wildlife Refuge has

been working with Dr. Dave Evers, and other biologists from BioDiversity Research Institute (BRI) since the mid-1990s to capture and band Common Loons on refuge lakes as part of this long-term bio-monitoring study. In 2009, the Kenai NWR biology staff and loon biologists Lucas Savoy and Rick Gray of BRI captured and banded Common Loons from six previously monitored lakes.

Results of blood and feather mercury levels from Common Loons sampled on the Kenai NWR, and in the Mat-Su Valley in Alaska are the lowest in North America, and are considered to be a "reference or baseline value" because they have the lowest levels of measured mercury. Common Loons in the New England region have the highest.

Because Common Loons are long-lived fish eaters at the top of the food chain, impacts on a population may not be seen for many years. The Refuge plans to continue monitoring loons through this and other programs such as the citizen–based Kenai Loonwatch (www.AKloonwatch.net) to ensure that a healthy population continues into the future.

Elizabeth Jozwiak is a wildlife biologist for the Kenai National Wildlife Refuge, USFWS in Soldotna, Alaska. Liz is the local coordinator for the Kenai Loonwatch program. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Emma DeWeese: A five-month honeymoon would be a dream for most women

by Emily Sunblade

Emma DeWeese, a native of Colorado, traveled to Alaska shortly after her wedding bells rang in 1899 and spent several months on the Kenai Peninsula hunting with her new husband, Dall. She was the first documented sportswoman to point her rifle at the abundant game that roamed freely on the Kenai Peninsula at the turn of the 20th century.

According to an 1899 Field & Stream Magazine article on her honeymoon hunting trip to the Kenai, Emma DeWeese shot her first ram, taking seven bullets to finish the task. It was a handsome specimen chosen from 52 snow white beauties.

DeWeese experienced innumerable challenges, most while traversing rugged terrain all the while wearing thick wool skirts and high collared blouses.

In the interview with Field and Stream, Emma was asked to tell of the hardest part of the expedition. "Mosquitoes," she said.

Field & Stream reported that while traveling to Lake Kasilof (present-day Tustumena Lake), the party hiked upcountry and camped along a beautiful lake that was named Lake Emma in Emma DeWeese's honor.

The experienced guide who led Emma and Dall DeWeese into the Tustumena Lake country was big game guide Andrew Berg. Dall DeWeese sought out Berg after seeing a set of Berg's spectacular moose antlers in a trophy dealer's shop in Tacoma, Washington in 1897.

Andrew Berg, an immigrant from Finland, came to Alaska in 1888. He maintained his livelihood by big game guiding, mining, trapping, fishing, and working for salmon canneries. In the 1890s he found himself as one of the most sought after big game guides in all of Alaska and eventually when the Alaska territory began official licensing, he received its first big game guide license. He also went on to become a game warden on the Kenai Peninsula in 1920.

When Emma and Dall DeWeese returned to Colorado after their hunting honeymoon in Alaska, news spread quickly of their hunting success. Big game hunters increased in numbers on the Kenai Peninsula and hunting pressure on prime trophy game specimens skyrocketed.

The hunting boom that sprouted from the DeWeese couple's fame had consequences neither they nor game guide Andrew Berg anticipated. By 1901 Dall DeWeese was petitioning President Theodore Roosevelt to establish hunting regulations on the Kenai Peninsula to decrease declining populations of moose and sheep.

Through the direct efforts of Dall and Emma and other big game hunters like them, laws to curtail overhunting were enacted and legislation was advanced to create specially designated conservation lands. The DeWeese's concern for a sustainable supply of moose ultimately led to the creation of the Kenai National Moose Range in 1941, which became the Kenai National Wildlife Refuge with passage of the Alaska Na-

tional Interest Lands Conservation Act in 1980.

The big game craze of Alaskan history has done much to influence the sustainable hunting legislation of today, and the documented experiences of people like Emma and Dall DeWeese and Andrew Berg give insight into a lifestyle forever memorable but now lost in time.

Emily Sunblade is a Student Conservation Association intern working in the Kenai NWR Visitor Services Program this summer. She is a journalism and history double major at Southern Illinois University at Carbondale, Illinois. She enjoys doing living history reenactments and formerly worked at Fort Union National Historic Site in Williston, North Dakota. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

YCC: Fostering a relationship between youth and the environment

by Ryan Belz

In today's society we use a number of different methods and strategies to entice youth to engage in the natural environment. While computers and electronics help to foster such growth, true conservation and subsequently an appreciation for nature, can only come about through intense interaction with the natural environment. I don't necessarily mean that each individual must weather out a blizzard or survive days without food in the wilds of Alaska. I do mean that each individual must interact with nature to an extent that they begin to feel ownership. Without this vital element the desire to protect is lost in a myriad of competing ideologies.

What does it mean then for a refuge or for any conservation organization to break through this electronic barrier of modern society to ultimately provide the kind of experience that will foster a sense of ownership and protection within our youth? One answer to such a question comes in the form of the Youth Conservation Corps or for short the YCC. The YCC was created in the late 1980s and was based on the concept of the Roosevelt era Civilian Conservation Corps. The main idea behind the YCC program is to foster an appreciation of nature within our youth, while providing a service to many understaffed parks and refuges. At my home refuge, the Kenai National Wildlife Refuge in south central Alaska, the YCC program has been an ever-present force for decades, employing on average eight local youth supervised by two leaders in an eight-week program.

As of late, the YCC at Kenai has shifted focus. As leader, it has been my intention or aim to provide these students with a set of skills that will serve them both in the backcountry and frontcountry for the rest of their lives. Coming from a background in carpentry, trail construction and conservation, the YCC has taken on these aspects as underlying themes to our projects. Our base goals for the past two seasons have been to create structures and areas that help to minimize the impact of an outdoor based society here on the Kenai Peninsula. In many areas, we are simply loving our wilderness areas to death—to borrow an old adage from John Muir. Two such areas on the Refuge are the Fuller Lakes Trail and the Skyline Trail, both located along the Sterling Highway. Access is easy to these places as the word "highway' suggests and with good reason, for both of these trails provide users with unparalleled views of the surrounding area as well as an intense wilderness experience in a relatively short distance. With the combination of access and beauty, it's easy to understand that these trails become focal points for area recreators. It becomes our purpose then to minimize impact in order to maintain the integrity of experience for all users to these areas.

Last year, 2008, the main projects for the YCC revolved around Fuller Lakes and the construction of two new bridges at the lake outlets—one at the lower lake and a second at the middle lake. Students were involved in the entire process of bridge construction. Trees were felled on site, then debarked and trimmed to size. Using chisels and mallets, students set about carving saddle notches for cribbing and stringers. In order to protect the fragile shoreline of the lake, materials were then floated across the lake and downstream from the mill site to the bridge site. Students worked at creating a solid foundation then erected the pieces and parts they previously crafted. In a joint effort with the Kenai NWR Trail Crew, decking was milled and installed using local beetle-kill and an Alaskan Mill. The result was a solid and stable bridge, some forty-five feet in length, constructed by a now skilled YCC Crew.

This year, 2009, the YCC shifted focus from the

Fuller Lakes Trail to the Skyline Trail located just a few miles to the west. Using the same methods as employed at Fuller Lakes, students, again in a joint effort with the KNWR Trail Crew, constructed a twenty-five foot bridge over a narrow creek as well as a thirty-seven step stair system. This new stair system replaced a previous system in a severely trenched and impacted area. Perhaps the most amazing aspect of the latter project was the sheer amount of material the students hauled to the project site. Each of the thirty-seven stairs required three pieces ranging in weights from twenty-five to forty pounds each—that's one hundred and eleven pieces for a total weight of nearly two tons, all of which was carried over half-a-mile up a step mountain trail with grades sometimes approaching thirty-five percent. That two tons doesn't take into account tools and equipment, food and water as well as tired and aching bodies.

These projects serve a two-fold purpose. Not only do the bridges and stairs serve to consolidate and minimize impact to fragile areas; they also serve to bridge the gap between youth and their environment. Students spend weeks and months in wilderness areas constructing these structures using only their hands and few simple tools, pouring their blood, sweat and sometimes tears into each project. Through this interaction they form an intense bond with their project, project area and fellow students. Many of the students will spend the week traversing a trail, sometimes dozens of times in just a few days while transporting equipment and materials, then turn around and bring their family and friends back on the weekend in order to show off what they have accomplished. These areas become sacred and it's easy for me to image that these students will make the pilgrimage back year after year, perhaps even one day bringing their own children. If this is the best we can do to foster a relationship between youth and their environment—then I say job well done.

Ryan Belz has served as the Kenai National Wildlife Refuge YCC Leader for two years. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Departing refuge manager reflects on changes and future challenges

by Robin West

Last weekend my wife and I took our youngest child to Anchorage and checked her into a dorm at UAA. She joined her brother and sister, also attending UAA, which probably lessened the shock of leaving home a little for her, but not for my wife and me. We are now officially "empty nesters" but we don't really care for the feeling. Whether by chance or by a more defined destiny, the timing of our children leaving home coincides within days of us also leaving our home—our home of 14 years here on the Kenai Peninsula.

We are packing up our two remaining kids—a Welsh terrier and a German wire-haired pointer—and heading for Canada, in route to our new home in Oregon. It is with a combination of excitement for the prospect of new adventures in a new place, mixed with comfort and joy of many great memories, and also a sense of sadness of leaving a great state and community.

I have worked on natural resource management issues in Alaska for over 30 years—from the North Slope to the Aleutians, to SE Alaska. It has been wonderful. Our children have all grown up and gone through the school system in Soldotna. No matter where we travel, in many ways this place will always be our home, and it is our intent to keep a cabin somewhere on the Kenai to return to over the years.

I would like to share a few thoughts with Peninsula residents in my last contribution to the Refuge Notebook. First, I want to say thank you! This is a very special community and we have been treated extremely well both personally and professionally. Perhaps it is human nature to sometimes categorize people and organizations, and being a career federal employee I have been given plenty of grief about "the feds" or "Washington, D.C. bureaucrats" throughout my travels. Living and working here, however, I have sensed more understanding and acceptance than many other places.

I also have witnessed a deep care for the Kenai River and our entire natural environment by the local community. This may originate from the choice people have made to live here. It seems that most people truly treasure the clean air and water, beautiful scenery, and opportunities to hunt, fish, and view wildlife. And whether folks argue about who ought to get the fish (sport, commercial, or subsistence users) everyone supports doing what is necessary to protect the habitat so that we have fish in the future to argue about. This community attitude, I believe, has made the conservation work for me at Kenai National Wildlife Refuge much more successful and rewarding than it might otherwise have been.

I also predict that there will be new and evolving issues ahead that will challenge Peninsula residents to use their best collective talents to resolve. As the area grows, and more development occurs, a balance between creating jobs and growing the economy with maintaining environmental quality and the quality of life will need to be sought. Some of this balance will be value-based, and that makes it difficult, for some will wish to maximize or minimize certain uses or activities to best fit their view of the world. This too is part of human nature.

And then there will be opportunities to make decisions to balance growth with environmental protection that are science-based. Managers can model such things as how much development can be facilitated along the banks of the Kenai River, and in what fashion, before risking the sustainability of the River's water quality and fisheries. But even good scientific backing will not ensure success of future management decisions. Individual property rights are part of our strong foundational freedoms and can easily be pitted against desired long-term planning goals, (and I'll use the "Z word") zoning, and regulations spawned from predictable growth. These challenges will be great, but the local community is well poised to address them.

There will be other challenges. Energy is a critical topic for the Nation and for Alaska. Southcentral Alaska and the Kenai Peninsula also, are on the verge of an apparent energy crisis. Available cheap energy has been an important part of the foundation of the area's economy for the better part of 50 years. Within

10 years time it is possible that natural gas will be have to be shipped into the area to meet the domestic and industrial requirements (and at an increased cost). It is possible that significant new discoveries will be made locally, or that a pipeline will supply the area from elsewhere, but folks are going to be faced with some difficult choices. Expect increased discussion of coal-fired power plants, wind energy, and hydroelectric power to join the ongoing search for additional oil and gas resources.

Fire management will also likely become increasingly complex on the Kenai Peninsula. In recent decades we have witnessed a warmer and drier climate that has helped facilitate a spruce bark beetle epidemic, indirectly affected habitat conversion in some areas to very flammable grasses, and influenced weather changes that have increased the occurrence of lightning storms and natural ignitions. If current weather patterns persist, we might expect a relatively severe fire season every second or third summer in the foreseeable future.

I could speak to other issues related to climate change, predator management, subsistence use, recreational crowding and carrying capacity, or other issues that stir emotion and keep resource managers employed, but I will save those topics for my successor and a very capable Peninsula community. There are indeed many challenges ahead, but the rewards will also be great. With determination and a continued positive community spirit, the Kenai Peninsula will be a wonderful place to live and visit for many generations to come. I thank everyone again for the honor and privilege to work here, and wish you the very best.

Robin West is leaving Alaska after 31 years for a new job and eventual retirement in Oregon. He has been the manager of Kenai National Wildlife Refuge for the last 14 years. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Free pizza and a passion for wildlife

by Betty Siegel

Friday night, Sept. 11 at 6pm a passionate group of people will be meeting at the Kenai National Wildlife Refuge Headquarters on Ski Hill Road in Soldotna, and you are invited to eat pizza and find out what they are so excited about. They are the Friends of the Alaska National Wildlife Refuges, and they are passionate about wilderness and wildlife, about educating the public about Alaska's 16 National Wildlife Refuges, and helping the refuges accomplish their missions.

They are also passionate about volunteering. Betty Siegel, a retired social worker, never expected to find herself on hands and knees in the dust of the Dalton Highway pulling invasive weeds until she got involved with the Friends. She never dreamed she'd be teaching young children in tiny communities on the refuges how to use binoculars and identify birds.

Marvin and Sharon Baur never thought they would end up selling their home in Arizona and moving to Alaska where Friends brought them opportunities to travel all over the state helping refuges with projects ranging from festivals to rat prevention to running the remote refuge station at Adak.

Brenda Dolma, a retired teacher, found new ways to share her education and art skills and knowledge with children in a fishing weir/science camp.

Vera Stein, an art therapy teacher and flight attendant for Pen Air, found new opportunities to teach art in bush villages.

Bree Murphy, a graduate student, found her Master's thesis subject (educational learning occurring at the convergence of traditional knowledge and western science) as a result of volunteering at a science and culture camp near McGrath.

Friends of the Alaska National Wildlife Refuges are indeed a passionate group of people. Friends' volunteers are educators and advocates for the refuges. They help the refuges with wildlife management and habitat improvement projects. They help fund refuge-oriented projects through grants, memberships, donations, and other activities. There are many underfunded and understaffed projects and needs of the refuges, and these dedicated volunteers strive to assist whenever and wherever they can. Some ways they have served include:

- Helping in science and culture camps,
- Leading bird walks in native communities,
- Working to control non-native, invasive species that threaten the refuges,
- Testifying before congressional committees in Washington, D.C.
- Writing advocacy letters and material for newsletters and articles,
- Bringing environmental issues to cities and communities through lectures and plays and photo exhibits
- Teaching photography and art to native children
- Rowing a raft transporting kids to fishing weir/science camp

- Helping the elders prepare meals in remote camps
- Serving on the Friends board and committees
- Organizing Refuge Centennial celebrations in five locations
- Preparing and packing Rat Prevention Kits for distribution to boaters

While the refuges obtain many benefits from the work of the volunteers, the Friends also gain knowledge and new skills and rewarding experiences. They learn about the Alaska Refuges from refuge staff and from first hand observations; they learn about native culture, bush life and a subsistence lifestyle; they interact with elders and children of all ages in settings which defy description; they increase their ability to be flexible and adaptable when nature changes the schedule and leaves them stranded on a river bank or when supplies and people are unable to arrive when expected; they learn about Invasive plants and their potential impact on refuges, and find they are willing to deal with dust, dirt, bugs, and sore muscles to prevent their spread. Volunteers also receive gratitude and appreciation from refuge staff and the knowledge they are benefiting present and future generations.

Not everyone is able to go to a remote camp or lead a bird walk or organize an event, but members have found many ways to contribute their unique skills. They may have grant-writing abilities, can do data entry, write a newsletter article, or assist in other ways. Many members are employed full time with families and can contribute only occasionally; some live out of state and help out via computer and teleconferencing. As the membership grows and the refuges find additional ways to use the Friends, additional opportunities will arise.

The Friends' Annual Meeting is taking place at Kenai NWR Saturday, Sept. 12. The public is invited to a Pizza Party on Friday night at 6pm. This is an opportunity for everyone to see who they are and what they are all about. Come on over and enjoy free pizza and hear about their experiences.

Betty Siegel is the Volunteer Coordinator for the Friends of Alaska National Wildlife Refuges, which is an independent, non-profit organization dedicated to promoting conservation of the natural resources of all the Alaska National Wildlife Refuges, promoting understanding and appreciation of these refuges, and assisting the USFWS meet its mandates. For more information see www.alaskarefugefriends.org or contact Betty Siegel, Volunteer Coordinator (907) 235-1598 or Sharon Baur, Vice-President (907) 226-2135. You can check on new bird sightings or report your bird sighting on the Kenai National Wildlife Refuge Birding Hotline (907) 262-2300. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Chickaloon Flats Journal II

by Sean Ulman

Biologist Sadie Ulman watches shorebirds with a spotting scope from a homemade tower on Chickaloon Flats Photo Credit: Sean Ulman

Sean Ulman has been assisting his graduate student wife Sadie Ulman with her research on migrating shorebirds on Chickaloon Flats on the south side of Turnagain Arm. Here are a few pages from his daily journal describing his impressions of the final days of fieldwork in late July out on the Flats.

It's the evening of the 35th day of our second stint at Chickaloon Flats studying shorebird migration. Within a week of our departure I feel brave enough to suspend my perspective of 'plod on, keep plugging' and reflect back.

The event that stands out is not the capture of our first bird (a miracle shot that I put on a greater yellowlegs juvenile with a net gun—a hefty 4-barrel pig of a gun that shoots a net up to fifteen yards when aided by wind), nor the next day when we trapped five more in a tensioned drop net. The following day, however, brought the first big tide (29.4')—boosted by gusty NE wind—which inundated the Flats and changed the country from mud to marsh. Sadie did a morning high-tide shorebird survey and ended up stranded atop the 9-foot tower we built out of driftwood. For two and half hours she dallied with delusional concerns above the deluge.

Our trapping site that had been two narrow slough drainage pools was now a full-fledged pool teeming with foraging yellowlegs and dowitchers. A single black turnstone—a squat pudgy dove-like black bird with a white eye ring and my first lifer of the Fall—had also trickled in. Despite the riveting activity we failed to capture any birds and grew frustrated by the 90-minute hassle of moving our net. That night despite our exhaustion we decided to fetch water. We were down to half a day's worth, the tide was down, and the bigger tides due over the next three days would make the one-hour travel to the creek for water more than tedious.

That walk that night is the choice crux since it encompassed three elements that I've identified as integral to this field camp experience—morale, resourcefulness, and wise budget of time in relation to energy and elements—and due to my sense (aided by mist, storm clouds and swishing treetops) during the occasion that it had already occurred. That while within the experience I was already reflecting back upon it.

Both of our chest and hip waders were holey so we chanced it in Extra-Tuffs, a trusty boot true to its brand name. As the mushy marsh gave in above our ankles I thought about Lieutenant Dan's advice to Bubba and Forest, "Take care of your feet," and looked forward to a pasta meal from our meager rations, reduced to an amount I can consume in a lazy weekend. Trudging on we soon noticed that Pincher Creek, which links with a tidal slough, ran gray with brackish water. The morning's tide still hadn't funneled out. I scratched my mud be-grimed beard, gave up hope of taking an overdue dip and worried about whether we could even get to the water. We recalled simultaneously, "the beaver dam!" and sauntered on aware that the hike's length had just doubled.

We wound around oxbow bends that curled up to the timber. Beneath chest high sedges and grasses, parted here and there by black bear paths, the marsh grew mushier. The wind whipped up. Two rusty blackbirds flushed in front of us, gurgled a liquid call and looped into the woods.

The beaver dam was thatched with mud, gnawed logs, green-leafed boughs and grass. The freshwater pool was ledged like a shelf above the silted-clouded creek. We filled two five-gallon jugs and headed back.

A pond filled with shorebirds on the Flats. Photo Credit: Sean Ulman

Bolstered physically and mentally by a surplus of water, we would catch eight birds the next day, whereas following day we would set up another net and catch nothing but enjoy great birding. There was the usual traffic and symphonies of yellowlegs and dowitchers. A flock of twenty juvenile Bonaparte gulls bombed the pond and swung several circles before heading to shore. Four hudsonian godwits landed ten yards from us and with their carrot-striped bills combed and preened their non-breeding plumage, a frosty gray shade like thunder clouds just after the storm clears. We caught three more shorebirds during each of the next three days.

The wind waned on our walk back to the cabin. The mist persisted. I kept expecting a bear to trudge out of the timber. The ambiance seemed to deserve a bear. Bear spray in hand, shotgun slung over my shoulder, I imagined several bears with clacking jaws and bluff-charges but no actual bears appeared.

I thought about the industrious beavers that had enabled our water re-supply. How nifty and multi-purposeful nature could be. I looked back at Sadie and said she looked pretty. As in life, compliments go a long way in the field. A kind word might tap energy.

"Your lips are very red."

"That's because I'm dehydrated," she replied. "I know I am. I can feel it."

Thankful that we now had water, I also noticed the irony of a dehydrated person hauling untreated water.

A band on the leg of a greater yellowlegs. Photo Credit: Sean Ulman

In the distance ahead perched between a span of verdant hills the buildings of Anchorage shone like a mirage in the late evening sun. The entire flats meanwhile remained shadowed in a sad, charmed, October-like gray hue. A raven called, 'plonk, plonk.' Waiting for Sadie to catch up, I picked out the raven's nest we found back here in late May. I wondered if we would see the same pair using the nest next year when we return for the project's second and final year.

We fell in stride side by side. I held my wife's hand, not to practice being in public again, nor to brag to the birds. I reached out because her right hand, never quite the same since twelve-hour shifts on a cannery slime line, gets cold very quickly.

Our arms swung slightly as we gazed at the windows of homes on the bluff reflecting rectangular peach and pink flashes of the setting sun. I thought about how the drop nets worked and will keep working and that we were going to catch a lot of birds. Rather than laboring we seemed to be strolling now, not back to town or even to the cabin, but into next spring.

Sean Ulman received his MFA degree in creative writing from the Stonecoast program at the University of Southern Maine. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Fall Fun Day events at Kenai National Wildlife Refuge

by Candace Ward

Come enjoy the Refuge's annual Fall Fun Day

Fall is such a wonderful time to be outdoors—whether you go birding, berry picking, hiking or fishing, each day is a feast for the eyes as the landscape changes dramatically.

You can enjoy this season even more by coming out for the Refuge's annual Fall Fun Day. The event takes place on Saturday, September 26, from 10am to 2pm at the Refuge Visitor Center and Environmental Education (EE) Center on Ski Hill Road in Soldotna.

The schedule of events includes:

10 AM - 12:30 PM: Head to the Environmental Education Center for fun kids' activities that will focus on understanding the ecology of bears. There will be a creative, take-home craft project for each child. Sign up for bear related door prizes donated by Alaska Geographic.

10 AM - 12:30 PM: Visit the historic Andrew Berg Cabin hosted by volunteer Bud Crawford, who helped renovate the cabin in 2000, and has crafted many historically accurate items for the cabin. Complimentary hot chili and cider will also be provided at the cabin.

12 - 12:30 PM: "Hiking Alaska's Kenai Peninsula" Slide Show – Join photographer Taz Tally as he shares his experiences hiking and photographing the Kenai Peninsula's scenic trails. After the program, Taz will have his book, 50 Hikes in Alaska's Kenai Peninsula, available for sale and signing.

1 PM - 2 PM: "Bear Wrangler" Slide Show – Join retired Kenai NWR Manager and wildlife biologist, Will Troyer, as he presents a slide show sharing his life experiences researching bears and other wildlife in Alaska's national wildlife refuges and parks. His new book, Bear Wrangler, will be available for purchase and for him to sign after his program.

2, 3 & 4 PM: The Visitor Center will feature the hour-long movie Alaska's Grizzlies highlighting the premier bear viewing areas of Alaska.

The following outdoor hikes are also offered. Please call 262-7021 to pre-register as space is limited.

10 AM: Centennial Trail Hike – 2.2 miles for ages 16 and older; 1hr. & 45 min. time frame - Hike with geologist/photographer Taz Tally as he shares the geology and ecology of the Kenai lowlands. He will also give tips for photographing wildlife and landscapes.

11 AM & 1PM: Keen Eye Nature Trail Walk –1/4 mile walk for all ages; 45 min. time frame – Go exploring with education staff to discover through a variety of activities how fall changes affect wildlife and people signaling us to get ready for winter.

So, please get out and enjoy autumn's delights at the Kenai NWR Fall Fun Day!

Candace Ward is a park ranger, who leads the Refuge's information and education programs. For more information about Fall Fun Day, contact Kenai National Wildlife Refuge at 262-7021. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Mallard duck rescued from monofilament line entanglement

by Duston Beyer

It's really the little things we do in our daily jobs that give us an opportunity to share interesting stories, reflect on lessons learned, or inform the public of what we are experiencing out in the field. One of these examples was an opportunity to disentangle a trapped bird which was wrapped up in discarded fishing line.

On Wednesday, September 16th, 2009, I was asked to help with an injured bird call, and went out with Refuge wildlife biologist Liz Jozwiak to the Soldotna Visitors Center, where I put away my gun and badge and instead became a bird rescuer for about an hour.

Liz and I headed down the boardwalk to where both, the Visitor center staff, and several visitors had reported a Mallard duck in "distress" entangled in monofilament fishing line in the Kenai River. The bird was desperately trying to free himself from the fishing line, to no avail, as the line that was wrapped tightly around his neck and body, and had also become entangled on a submerged log, and each struggle tightened the noose and drew him closer to submersion.

I was the one with the hip waders in easy reach, so I jumped into the water and approached the duck with net and scissors in hand. I freed the bird from the log, and then handed him up to Liz who carefully removed the tightly wrapped line from about his neck and gave him a thorough "bill to webbed foot" checkup.

Once Liz was certain there were no other injuries, I took him to the water's edge and released him back into the wild. It was an awesome thing to see this beautiful bird take flight to join the others nearby. If it wasn't for the concerned citizens who found the entangled bird, and the staff of the Soldotna Visitor's Center who took the time to give the Kenai NWR a call, the situation could have had a much more "fowl" outcome!! It was actually even more awesome to see the joy on the faces of those people who reported the incident, and were able to see a happy ending; the return of the freed bird to his normal life once more.

I want to take the time to thank the public who showed concern and who offered assistance when needed. This also brings me to my reasons for mentioning this bird in my article. I believe that if more people would take the time to pick up spent fishing line and lures they see on shore, then less wildlife would be entangled.

It is these secondary or hidden effects that do the most harm to our wildlife population long after the fishing season ends. Earlier this year, Liz mentioned that a bald eagle was reported injured along the Kasilof River. It had a Quikfish lure that was hooked onto its tongue and the second hook embedded into its right wing so it could no longer feed or fly. Once again, a concerned citizen reported the incident, and the bird was captured, and the multiple hooks removed. Unfortunately, we do not always see a happy ending to many of these situations which are not seen or reported.

We are hoping to work with other cooperating agencies next season, such as Alaska State Parks, the U.S. Forest Service, and several Kenai River Watch groups to once again install recycling boxes for used lures and monofilament line next season along high public use shorelines. We should also do our part in educating the users of rivers of the lasting effects of discarded line and lures, and keep our watersheds free of trash for everyone's enjoyment, and for the safety of the birds as well.

Duston Beyer is a law enforcement officer at the Kenai National Wildlife Refuge. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Bird brains may be bigger than we think

by Todd Eskelin

Ever wonder why people don't get your subtle clues that you are in a hurry and need to get going? Like when you bump into a friend at the grocery store and you keep looking toward the door, but they just keep talking. You glance over again and nothing. They just don't see that you are giving them hints with your eyes that you need to be somewhere else. Recently a study came out in Europe that birds can actually recognize human gaze and alter their behavior accordingly. So are these birds smarter than our friends at the grocery store?

This was a very controlled study where Jackdaws, a close relative of crows, were hand-reared and were trained for particular food preferences. These birds where tested with and without the researchers gazing in the direction of the hidden food. Consistently, birds who were able to watch the researchers gazing in the direction of the food found the reward quicker than those who did not have the advantage of researchers' eyes leading the way.

Admittedly, there are a whole host of reasons why we can't look at this study and make sweeping statements about bird intelligence. But, it is still fascinating that these birds were able to watch a person's eyes and determine the location of hidden food. So, I am hesitant to make any comparisons to my friends after this study, but it raises some interesting questions about bird abilities.

OK, now I am intrigued. I wonder if our local crows are as smart as European Jackdaws. I had the opportunity to work with some researchers banding Northwestern Crows in the local area a few years ago and I am convinced from our anecdotal observations that our crows are at least as smart as Jackdaws. We were baiting crows with their all-time favorite food, Cheese Puffs. The trap was a large net suspended over the Cheese Puffs, and when several crows would go under it to retrieve food, we would pull a string and drop the net on them.

If we were standing around a short distance away or sitting in the car watching the trap, the crows would go in one at a time while the others watched us. If we even glanced over at the pull cord, they would react and move just out of range.

We then decided to try and just catch one crow rather than going for the home run of three or four at a time. While processing the one we had just captured, we all had our heads down working on the one bird, and four crows bolted in under the net and grabbed some food. Of course, when we looked up they all retreated. Now I don't need to tell you, but I will. Of course WE were smarter than those crows and figured out that all we had to do was look down and act like we were working up another crow, and boom we caught three in one pull. This worked for a little while and then the rest of the group decided the french fries over in Kenai were a safer bet.

We tried again two weeks later with the same methods and found that many of the birds remembered us and we had limited success. The following year we had good success early in the season, indicating that their long term memory is not as good, or perhaps there was a turnover in the population and we were working with new birds.

So, armed with this information I headed down to the grocery store parking lot and did my own little test. I rolled down the window and looked eye to eye with a crow. I gave it my very best look of, "I have food and would love to give you some" and I got a blank stare back. It was definitely watching me. So then I changed my look to, "If I could stomach it I would eat you right here in this parking lot." I got the similar blank stare response until another car pulled up and started dumping out their unwanted french fries. I immediately lost all my audience. Result: inconclusive. The bird was smart enough to figure out I was teasing it, but my study design really didn't help me determine if the bird was able to recognize facial expressions. Guess I will leave it to the pros with the hand-raised birds, and simply admit that the average crow is fairly smart, I just don't know how smart.

The real point is that stereotypic comments about "bird brains" may be a little misdirected. There are times I would put my money on the birds when it came to an IQ test and sometimes we just don't give them enough credit. Maybe, when we are concerned about that poor bird that seems to be here too late in the year to migrate, we should consider the possibility that it

wanted to be here. Now if I can just teach the ravens to call in a moose for me…

Todd Eskelin is a Biological Technician at the Kenai National Wildlife Refuge. He specializes in birds and has conducted research on songbirds in many areas of the state. You can check on local birds or report your bird sighting on the Kenai National Wildlife Refuge Birding Hotline (907) 262-2300. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Kenai Refuge gets stimulated

by Scott Slavik

During the summer of 2009, the Kenai National Wildlife Refuge used funding from the American Recovery and Reinvestment Act to expand opportunities for youth and young adults to become engaged in conservation work. As a result of Recovery funding, the refuge was able to hire additional personnel to complete "shovel ready" resource management and conservation projects that enhanced and expanded a variety of programs, projects and departments at the Kenai Refuge.

The Kenai Refuge's long running and locally-based Youth Conservation Corps (YCC) received stimulus dollars that funded an Assistant Crew Leader position for the program. Christa Kennedy, resident of Soldotna currently attending college in New Mexico and a veteran two-year YCC participant returned to co-lead the program this past summer. She directed the work of eight local high school students completing a significant trail enhancement project on the Skyline Trail and assisted in the construction on the new Kelly Lake public use cabin. YCC is perhaps the refuge's most successful program offering young adults job training and an introduction to careers in conservation and natural resource management. Christa's leadership, made possible by stimulus funding, was a key factor to the success of this past summer's program.

The refuge's fire program also benefited from Recovery funding by being able to hire five additional fire fighters. These college students, both local and from the Lower 48, were a contributing force in the suppression efforts of wildfires across the state and closer to home, the Shantatalik Creek Fire. When not actively fighting fire, the crew completed habitat enhancement projects, prepared plots and constructed hand lines in preparation for future prescribed burns. Additionally, the extra personnel allowed adequate staffing of engines necessary during times of high fire danger. The students gained extensive "hands-on" experience and valuable training in wildland fire fighting and natural resource management as well as some extra cash to help pay for school.

The public use cabins of the Kenai Refuge continue to gain in popularity and regular users will notice some improvements that have also been made possible by stimulus funding. Specifically, increased maintenance and project work has been completed on Doroshin Bay, Big Indian, and Caribou Island cabins, all of which are available for public use and are on a fee-based reservation system. Most notable is the reopening of the airstrip used to support fly-in access to Big Indian Cabin.

The American Recovery and Reinvestment Act funds received by the Kenai Refuge have and will continue to have direct and indirect benefits to local residents as well as our "outside" visitors. Additional employment opportunities were created and refuge resources have been protected, enhanced and upgraded allowing continuing enjoyment of our public lands and the availability of quality recreational opportunities on Kenai National Wildlife Refuge.

For more information regarding the Youth Conservation Corps, employment opportunities or Kenai NWR public use cabin program, please contact the refuge at 262-7021. Scott Slavik is a Backcountry Ranger on the Kenai National Wildlife Refuge. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Secondary poisoning to Bald Eagles from Pentobarbital

by Liz Jozwiak

Last November I was called out by the Skyview Ski Team to rescue an injured eagle they found lying on the ice on Arc Lake. At first it appeared not to be breathing, but upon closer examination it was alive but unconscious and hypothermic with a very slow and depressed respiration rate. I knew almost immediately what it was suffering from as I had worked on an eagle with a similar set of symptoms earlier in 2008 in almost the same area. The eagle had been accidentally poisoned by feeding on a euthanized animal carcass that was later identified as being from a euthanized dog.

I quickly took the bird to our laboratory at the Kenai NWR and started to gradually warm him on a heating pad that I placed under some blankets. The bird was still unconscious which made it easy to keep the bird's head and chest elevated so I could regularly administer fluids and a solution of activated charcoal every few hours. At some point that first night, the eagle regurgitated a chunk of the meat it had consumed. I continued to give the eagle fluids for the next three days as the bird remained unconscious… it was sleeping off the drugs it still had in its system. By the fourth day, the bird was beginning to open his eyes and lift his head. On the fifth day the eagle was attempting to stand but kept losing its balance, and slept some more. Finally one week later, he was able to stand.

This was one lucky bald eagle as it survived secondary poisoning from ingesting meat from a euthanized dog carcass. The euthanasia drug that is most commonly used by veterinarians and animal control officers is Pentobarbital. Pentobarbital-euthanized carcasses are very poisonous to scavenging wildlife.

Euthanasia by sodium pentobarbital injection is a humane way to end the life of a suffering animal, and is recommended for many species by the American Veterinary Medical Association. But sometimes this compassionate act can have the unintended consequence of causing the premature death of other animals.

Residue from sodium pentobarbital remains in the tissues of animals long after they have been euthanized. Well-vascularized organs such as the liver will have especially high concentrations of pentobarbital, but other tissues will also contain residues. When a scavenger feeds on the carcass, the degree of intoxication will depend on the amount and type of tissue it ingests. A lethal dose for a bird is generally much lower than the amount administered to euthanize a dog or cat.

Birds may die immediately after consuming tissues containing pentobarbital, or they may fly several miles and die due to vehicle collision, electrocution, predation, drowning, or hypothermia while they are sedated by the drug. Species confirmed with accidental pentobarbital poisoning include bald eagles, golden eagles, and other scavenging birds, such as ravens and magpies. Many other species of avian and mammalian scavengers, including pet dogs and cats, may become intoxicated or die after ingestion of carcasses.

The fatal poisoning of more than 130 eagles in 16 states and British Columbia is known to have occurred due to consumption of contaminated carcasses.

Improper disposal of euthanized animals may lead to prosecution under state and federal laws, including the Golden and Bald Eagle Protection Act, and the Migratory Bird Treaty Act. These laws are enforced by the USFWS and carry penalties of fines and imprisonment for criminal or civil offenses resulting in harm to wildlife.

In most cases, the poisonings are inadvertent and the result of poor communication. Often, animal owners are unaware that a pentobarbital-euthanized carcass can be poisonous to carrion feeders, and must be made inaccessible through rapid burial or other means of disposal. Tragically, in several past cases in the lower 48 well intentioned farmers had purposely left out carcasses because they thought that the local eagle population would benefit from this extra food.

In other instances of poisoning, small animal carcasses from veterinary practices or humane shelters have been legally deposited in a landfill but then left exposed to scavengers because they were not covered over in a timely manner by the landfill workers.

The first confirmed case of a poisoned bald eagle was discovered in Soldotna in the 1980s. At that time the USFWS, the KPB Soldotna Landfill, the two local animal shelters, and the local veterinary clinics acknowledged that this was an important issue to resolve, and

worked successfully towards eliminating the chances of any animal becoming ill or dying from secondary pentobarbital poisoning from a euthanized pet or farm animal.

For example, the Soldotna Landfill installed a "covered carcass bin" behind their building where all euthanized carcasses are to be placed. This bin is driven out to the landfill cell and the contents deeply buried three to four feet at the end of each day. Most veterinary clinics have purchase their own incinerators, and therefore disposal is not an issue. The animal control officers in our area are aware of proper disposal procedures and adhere to them without question.

These recent two eagle poisonings however, document the fact that eagles are still periodically able to scavenge euthanized animals from either inside or near the Soldotna landfill. The U.S. Fish and Wildlife Service is trying to find out how and why.

I suspect that the weak link may be the pet owners themselves who are unaware of the potential toxicity of their euthanized pet when they choose to take it home for burial from the vet clinic. These owners decide instead to dispose of the carcass at the landfill because they are unable to bury their pet as earlier intended. But unless you are an animal control agent or a veterinarian, you may not be aware of the "carcass bin" behind the landfill building. The poisoned carcass then enters the landfill without any knowledge to the landfill workers and this provides easy access to scavengers.

In the last few weeks I have been contacting the veterinarians in our area to help us launch an educational effort to inform clinic clients and the local community of the potential risk of unintentional pentobarbital poisoning to wildlife and methods of proper landfill disposal or burial. The response has been very positive so far.

Elizabeth Jozwiak is a wildlife biologist for the Kenai National Wildlife Refuge, USFWS in Soldotna, Alaska. Liz is also a federally licensed wildlife rehabilitator specializing in the care of bald eagles and raptors in the Soldotna area. You can report your bird sighting on the Kenai National Wildlife Refuge Birding Hotline (907) 262-2300. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Local bird hotline leads to little treasures all year long

by Leah Eskelin

As our days shorten and the snow inevitably starts falling here on the Kenai Peninsula, it is hard to imagine standing quietly along the river bank or on one of the Refuge trails watching for a particular bird. It becomes easier and more interesting when you know that three other people have just seen this special little bird in the past week. Your search is a treasure hunt now, not just a hope for a chance encounter.

Using the Central Peninsula Birding Hotline, we all have the opportunity to hear about new and interesting bird sightings and share our own finds with everyone else. With a quick listen to today's message, for example, we can learn that there is an impressive number of waterfowl right now on the Peninsula, and that there has been a sighting of a relatively rare Great Gray Owl.

The sightings listed on the Hotline are not just for the birders trying to get their Kenai 200 (two hundred different species seen on the Peninsula), but for anyone who spends time on the Peninsula. You can bird from your car in the Safeway parking lot just as you can on a local trail. The species you see will be different, but I am already waiting for the waxwings' arrival this winter on the trees outside the CES fire station, and love seeing them just as much as the shorebirds down on the Kenai beach.

I have been birding on the Kenai for six years and still have not seen many common species. (I would love to hear where you saw a Three-toed Woodpecker, or Varied Thrush.) However, I have seen an Ivory Gull at the Kenai Flats and made it to the Soldotna landfill in time to see the Iceland Gull a few years ago, too. As a relatively inexperienced birder, I know I have much to learn about field identification, and could not have picked out these two special birds in the bunch without help from other birders. So, I regularly check the hotline before I head out for the day just to be sure I don't miss a great bird. It always helps to know what to look for, so I can take a quick look at the bird book and get the bird's field cues into my head.

Likewise, when I see a cool bird, I just can't keep it to myself. Who do I call? Instead of making my way down the list of all the birders who just can't miss this birding opportunity, I call one number: the Central Peninsula Birding Hotline: 262-2300. Unlike some hotlines that only allow the caller to listen to a pre-recorded message; the Refuge recognizes that our community members often have the best information to share. So, in recognition of that fact, this hotline has been set up to be very interactive. It relies on your input! Where did you see that beautiful eagle? When did you spot that swan cygnet? Indeed, this hotline is only as successful as its users, and that means you, too.

Have you used the Hotline in the past? It has undergone some changes that might throw you for a loop, but listen carefully to the new list of options and you'll find the Hotline happily sharing the line with the Refuge's wildlife crossing study on the Sterling Highway. As the Hotline coordinator, I am now checking the messages weekly and updating the Hotline sightings at least bi-weekly starting this month.

Beyond the Hotline, our Central Peninsula community has opened its arms to birding. Have you checked out the new viewing platform just off of the City of Kenai port road? It provides a great view of the Kenai River mouth, where many gulls, eagles and shorebirds feed. A look into the marshy tidal flats reveals several species of waterfowl preparing for their upcoming migration.

Though winter may see a decrease in bird num-

bers here on the Kenai, it doesn't mean that they all migrate. My backyard birdfeeder is a favorite spot for chickadees, nuthatches and the occasional jay. My family enjoys watching these wintering birds flit between the suet and black oil sunflower seeds. My two-year-old daughter insists on running to the window when the larger birds arrive, and she is a pro at helping her dad refill the feeders when they get low on seed. In my opinion, the presence of birds at our window makes the long, cold winter much more enjoyable.

Now I mentioned a pretty special recent bird sighting at the beginning of this article. I know several of our most active birders probably dropped the paper, called the hotline for details and picked up their binoculars at that point ready to confirm the sighting, but those of you who stuck with me may still be curious about that owl.

Where was the Great Gray Owl seen? Now you know what I'm going to tell you! The Hotline is here for us all to use, so call it now (907-262-2300) to find out about the first sighting, but call it again when you get home and leave me a message about what birds you saw while enjoying this beautiful land we call home.

Leah Eskelin is a Visitor Services Park Ranger at the Kenai National Wildlife Refuge and the new Bird Hotline moderator. You can check on local birds or report your bird sighting on the Kenai National Wildlife Refuge Birding Hotline (907) 262-2300. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Curiosity and observations help solve a mystery

by Ted Bailey

"Then this past July I observed another American three-toed woodpecker drilling rows of horizontal holes in several birch trees from which sap was copiously flowing." Ted Bailey

"Nearly all our scientific understanding stems from observing and interrogating nature at some level. Nature as a teacher does not lecture or provide study guides. Instead, natural systems appeal to our innate curiosity, with the awesome and strangely beautiful compelling us to learn as best we can."

This statement by David P. Mindell, Dean of Science at the California Academy of Science in an article in Scientific American caused me to reflect on my own observations of nature and the reasons why I periodically write articles for the Refuge Notebook. I want to appeal to curiosity of the readers about their observations and hopefully make them more aware of and appreciate the natural world around them. Readers contacting me to ask further questions, providing additional information on a subject or merely thanking me for writing an interesting article are my best rewards.

I am always curious about observations for which I cannot find an immediate explanation. Sometimes when it is an unfamiliar animal or plant, I eventually find out its name and more information about it by consulting a field guide, searching the Internet or asking an expert in the field. Some observations however are more puzzling and may take longer—sometimes years—to resolve.

For example, over many years hiking and moose hunting on the Kenai Peninsula, I have sometimes come across a series of small horizontal holes in birch trees and could find no explanation for them. Perhaps you have seen them also. Some trees contained literally hundreds of rows of these small holes. Usually most of the small holes are old but a few may be fresh. I asked colleagues and searched the published literature for an explanation but without success. Then in the late summer of 2005 I came across literally hundreds of freshly-made holes in several adjacent birch trees. The leaking sap in the holes attracted numerous feeding yellowjackets and a few mourning cloak butterflies. But I doubted these rather fragile insects actually made the holes because the holes had been drilled deep into the bark. I suspected something else was responsible.

Two years later, in late summer 2007, I saw an American three-toed woodpecker fly to a nearby birch tree and begin pecking at the bark and feeding on the sap of recently drilled holes amongst many previously older-drilled holes. It was soon joined by two other three-toed woodpeckers that also fed at the holes.

Intrigued by my observation, I narrowed my literature search to American three-toed woodpeckers to see what others had reported. Surprisingly there was little information on sap feeding by this species, and apparently no one had ever reported them drilling into or feeding on the sap of birch trees. One person however, suspected that holes once attributed to feeding yellow-bellied sapsuckers in Interior Alaska, might have actually been made by American three-toed woodpeckers, although he apparently had not himself observed such behavior. Interestingly, yellow-bellied sapsuckers are not found or at most are extremely rare on the Kenai Peninsula and other species of woodpeckers and sapsuckers were also be ruled out.

I wrote up my observations for a peer-reviewed scientific journal and they were eventually published as a brief article in the spring of 2008 (Western Birds 34:171-175, 2008). Then this past July I observed another American three-toed woodpecker drilling rows of horizontal holes in several birch trees from which

sap was copiously flowing (see attached photograph).

I learned while reviewing the literature for my article that the European three-toed woodpecker—the counterpart of the American northern three-toed woodpecker—was more apt to feed on sap. One author speculated this came about because the sap-feeding niche in North America was already taken by several species of sapsuckers but others questioned this conclusion. And I also learned that birch trees were probably favored amongst other trees because the sap has a relatively high sugar content of 16%.

Although my original curiosity has been resolved, other unanswered questions still abound about this particular animal behavior. Why are only certain birch trees selected for feeding on sap and not the majority of birch trees? Are sap wells drilled every year or only during certain years for as yet unknown reasons? How long is the sugary sap fed upon? Is this woodpecker also responsible for other even smaller holes in rows or the stripping or narrow bands of bark especially on young birch trees? These questions are merely a small sample of the many that still await answers from curious observers in our natural world.

Ted Bailey is a retired Kenai National Wildlife Refuge wildlife biologist who has lived on the Kenai Peninsula for over 33 years. He maintains a keen interest in the Kenai Peninsula's wildlife and natural history. You can check on local birds or report your bird sighting on the Kenai National Wildlife Refuge Birding Hotline (907) 262-2300. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Permafrost on the Kenai Lowlands

by Ed Berg

Kenai NWR biotech Toby Burke is standing in the black spruce forest near the hole where permafrost was detected at depth of 7 feet. Forest shade and a thick moss carpet insulate the cold permafrost. (Photo by author)

For years I have been telling people that we don't have permafrost on the Kenai, at least not in the lowlands. There is likely some permanently frozen ground in the mountains around and under the glaciers, but I have never seen permafrost in the broad muskeg peatlands that cover so much of the lowlands on the western side of the Kenai Peninsula. It's always dangerous in science to say "never," and this summer I had to eat my words. We do in fact have at least one small area of real permafrost in the large muskeg running northeast of Sterling.

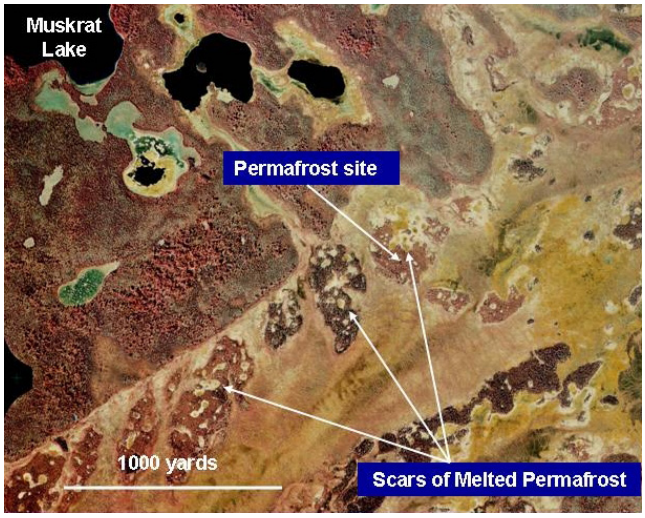
This area of likely permafrost was identified on aerial photographs by Paul Glaser, a peatland expert at the University of Minnesota. Paul has studied permafrost in peatlands throughout the boreal forest and tundra regions of Canada and Alaska for many years. In 1997 he systematically went through the aerial photos of the Kenai and identified a spot 18 miles northeast of Sterling that showed a distinctive signature of round pockets of open areas within black spruce forest (see photo). These round pockets are scars where the permafrost has melted, and the trees have fallen down and disappeared into soggy peat. Over time the round pockets coalesce into clumps, and the muskeg forest is gradually converted into open fen with very shaky, water-logged ground.

Mike Gracz, a wetland specialist from Homer, recently signed on as a PhD graduate student with Paul at U-Minnesota to study peatlands on the Kenai. Paul came up this summer to check out possible field sites with Mike, so Mike lined up helicopter to fly us out for a closer look at the possible scars that Paul had picked out on the photos.

The round pocket areas proved to be very shaky walking and we constantly had the feeling we might punch through the soggy surface into water below. We used a 19-foot steel rod to probe the peat and never hit bottom. Frequently we stumbled over buried black spruce trunks that had fallen into the wet peat and were overtopped by fast-growing Sphagnum moss. Paul said that this extreme sogginess is typical of melted permafrost in a peatland. In normal non-permafrost peatland typical of the Kenai lowland, the peat is fairly firm even though the water table is near or at the ground surface. In recent decades black spruce forest has grown up around the perimeters of many Kenai peatlands, often growing on top of peat that is 5 to 20 feet thick and quite solid.

The high point of our day arrived when Mike and Kenai Refuge biotech Toby Burke dug a hole back in the woods and hit unmelted permafrost at a depth of seven feet. There the closed-canopy black spruce forest and a thick moss layer provide insulation that has retarded the permafrost melting. Even so, the five feet of soil above the permafrost was quite loose and wet, which indicated that the permafrost has been melting, regardless of its insulation. We conjectured that within the next few decades the nearby melted open pockets will expand and swallow up all of this forest.

There have been occasional earlier reports of permafrost on the Kenai. Pioneering Alaska geologist David Hopkins and colleagues published a USGS report in 1955 that described permafrost under black spruce islands on the east edge of the Kenai lowlands, 20 miles east of Kenai. Their report shows a 1946 US Army Air Force oblique photo of the general area that we visited, but interestingly the permafrost scars are much less developed than they are in the 1988 photo shown here.



The round white patches are permafrost collapse scars. The permafrost site that we visited is 18 miles northeast of Sterling in the large muskeg between Sterling and Mystery Creek. (Aerial photo is 1988 false color infrared, provided by the Kenai NWR.)

Permafrost is of course a fact of daily life in interior Alaska. On the North Slope permafrost from the last ice age extends to depths of 2200 feet in the zone of continuous permafrost. South of the Brooks Range the zone of discontinuous permafrost extends as far south as Anchorage, with permafrost typically restricted to peatlands and areas of poorly drained soils. A 1977 study reported that 2-5% of the Anchorage area is underlain by permafrost, generally at depths of 15 to 35 feet, with the largest known patch being 30 acres in size.

Melting permafrost is a major issue in the Interior. Many roads and buildings are built on permafrost that is starting to melt. Roads buckle, and buildings sag as once-solid soil becomes unstable when the ice component melts. Thermokarst ponds develop in lowland forests, and trees tip into ponds, creating "drunken forests." The whole surface of the landscape becomes quite wet. I remember flying over the Tanana Valley to Fairbanks one afternoon with the sun setting in the west; the sun reflected off of hundreds of thermokarst ponds and made the entire valley look like a shimmering flooded forest.

On the Kenai we have the opposite situation. Not having permafrost, our landscape is drying, except for this exceptional situation northeast of Sterling. Our wetlands are becoming increasing shrubby and invaded by black spruce, and we don't have thermokarst ponds and drunken forests. Water levels in closed-basin lakes have declined, especially since the 1990s, and former ponds have turned into grassy pans.

It is interesting to speculate on the history of this localized spot of Kenai permafrost. It is highly unlikely that this permafrost is a relic from the last ice age, because most peat deposits on the Kenai have formed within the last 14,000 years, after the glacial ice had disappeared. Furthermore, it is unlikely that permafrost would have survived the warm Holocene Thermal Maximum (or Hypsithermal) period 9-11,000 years ago when summer temperatures were probably several degrees F higher. There have been several periods of minor glacial advance in the last 2500 years, suggesting colder summers, but the best candidate is the Little Ice Age which spanned roughly the 1300s through the 1850s. According to our estimates of summer degree-days based on tree-ring reconstructions for the Kenai Mountains, the coldest parts of the Little Ice Age were in the 1670s, early 1700s, and the 1810s-1820s.

Ground view of a permafrost collapse scar. The waterlogged ground was extremely shaky to walk on. Probing with a steel rod indicated that the soggy peat was more than 19 feet deep. (Photo by author)

To the best of my knowledge, there is presently no direct way of aging permafrost, i.e., of telling when permafrost became frozen. One can use radiocarbon dating to date the organic matter in permafrost, such as peat, but this matter could have been sitting on the landscape for thousands of years before it froze.

It should be possible to use tree-ring dating to determine the death dates of trees in the melted scar areas. Knowing death dates of the trees would tell us when the permafrost melted sufficiently to drown the trees. Most of the trees I examined were pretty well decayed, but the trunks underwater should be much

better preserved and have wood solid enough to date with tree rings, just as we date old log cabins and burn poles from old forest fires. Dendrochronologists (tree-ring specialists) in many places in Europe and North America have used well-preserved wood in lakes and rivers to date old piers, archeological sites flooded by impoundments, and sunken ships.

Melting permafrost is yet another talisman of our warming climate on the Kenai. It's not a big effect compared to the spruce bark beetle outbreak, drying wetlands, retreating glaciers, and rising treeline, but it does mark a rising tide.

If you have access to GoogleEarth on a computer, you can view the permafrost site at 60.70070°N, 150.34563°W.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Local authors share their passion

by Candace Ward

Nothing makes me happier during winter's dark and cold, than cozying up to a good book and a hot mug of cocoa. In light of the Christmas season fast approaching and knowing some of you may be searching for interesting books for the readers on your Christmas list, I would like to share some great books by local Kenai Peninsula authors. These authors have all spent countless hours researching, photographing, and writing about topics for which they have a deep and abiding passion.

Will Troyer, Cooper Landing resident and former manager of the Kenai Moose Range (now the Kenai National Wildlife Refuge), has written three fascinating books with the most recent book *Bear Wrangler* published just this year.

In *Bear Wrangler*, Troyer shares memories of his remarkable career as a pioneering wildlife biologist in Alaska from 1951 – 1982. He worked the length and breath of Alaska including Kodiak, the Kenai Peninsula, the Aleutians and the Arctic Coast researching bears, moose, sheep, caribou, and migratory birds. He describes the evolution of bear research from the early years trapping bears in large culvert traps and anesthetizing them with buckets of ether to more sophisticated methods of darting them with more effective drugs at close range. His often humorous writing style weaves his professional and personal life into highly entertaining memoir.

Catherine Cassidy and Gary Titus share their fascination with Kenai Peninsula history in *Alaska's No. 1 Guide: The History and Journals of Andrew Berg – 1869 to 1939*. Through their work on Andrew Berg's life, we come to understand "the draw" Alaska inspired for European immigrants seeking a better life, whether the lure was gold, fish, or game.

With the influx of people to the Kenai Peninsula during the 1898 Hope Gold Rush, the area's rich fish and wildlife resources yielded a second "boom" which almost became a "bust" until game laws, registered guides and wardens were established during the decade of 1910-20. Andrew Berg became Alaska's first registered big game guide in 1910 and later in 1920 an early game warden as well. Through Berg's journals we understand the challenges of living in a wilderness environment where securing food, water and shelter was done "hands on" every day.

Who has not been enthralled by a colorful swallowtail butterfly or Alaska's state insect, the four spotted skimmer dragonfly? Have you ever wondered what a spruce bark beetle really looks like?

Well, now you can find out with Dominique Collet's amazing field guide—*Insects of South-Central Alaska*. Collet's guide is beautifully photographed, extremely well written and organized, and goes way beyond basic insect identification. He includes information on insect anatomy, growth and development, senses, insect guilds, and many other fascinating tidbits about our local insect friends and foes.

50 Hikes in Alaska's Kenai Peninsula by Taz Tally is the first comprehensive hiking guide for the Kenai Peninsula. Taz and his dog Zip have hiked hundreds of miles of trails on the Kenai Peninsula multiple times. Taz shares in-depth information on each trail as well as special tips including vista points, wildlife, wildflowers, and geology. Beautiful photographs, helpful maps, and gear tips add to the richness of this book and really make you yearn to get out hiking in our own Kenai Peninsula "wilderness backyard."

To explore these books in more depth, check out our local libraries, book stores in the community, or here at the Refuge Visitor Center's bookstore. Wishing you great "reads" this winter with the adventures of our local authors.

Candace Ward is a park ranger, who has worked in the Kenai National Wildlife Refuge Visitor Services Program for 25 years. She enjoys learning about the natural and cultural history of the Kenai Peninsula both out in the field and by reading at home in her armchair. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Alien insects of Alaska

by Matt Bowser

An exotic Phalangium daddy long-legs consumes a native Nelima daddy long-legs

It is a blessing for us as residents of the Kenai Peninsula to live in a time and place where we enjoy largely pristine or at least functionally intact ecosystems. Alaska, thanks to its cold climate and limited human disturbance, remains dominated by the same flora and fauna that existed before western colonization. Our vast forests and mountains may seem impervious, but they are nevertheless vulnerable.

Weedy plants have gained publicity in recent years, and rightly so. Some of our more aggressive weeds have the potential to alter the landscape irrevocably. Most of us are also aware of how introduced Northern Pike could decimate salmon populations in the coming years if they infiltrate our river systems. Compared to weedy plants and vertebrates, we have much less information about most of our insect immigrants.

We on the Kenai should be the last to underestimate these tiny animals, having witnessed our mature forests of white spruce fade from green to rusty brown to gray, a victim of our native Spruce Bark Beetle. This species, a native resident, is usually held in check by predators, parasites, and the trees' own defenses. Insects brought here from other parts of the world may be far more destructive, especially when their natural enemies do not tag along with them.

We are currently aware of about 70 species of introduced insects and arachnids that appear to have become established in Alaska. About one-third of these are "synanthropes," species that live here only in association with people. These are such things as parasites like head lice and bed bugs, pantry pests, such as larder beetles and meal moths, agricultural pests dependent on crops or livestock, and intentionally cultivated species like European Honey Bees. The rest of our introduced insect species appear to be surviving without our assistance.

A few of our alien arthropods may be beneficial. The U.S. Forest Service intentionally introduced a species of parasitic wasp to help control the exotic Amber-Marked Birch Leaf Miner (*Profenusa thomsoni*), an example of classical biological control. Some other exotic insects immigrated along with their exotic host plants. The Toadflax Capsule Weevil (*Gymnetron antirrhini*) reduces seed production of Common Toadflax, one of Alaska's high-ranking noxious weeds. The Caragana Aphid (*Acyrthosiphon caraganae*) feeds on the Siberian Pea Shrub, also considered to be an invasive weed in Alaska. Neither of these insects tends to kill its host plants, although the host's growth and reproduction may be diminished.

Despite these few beneficial introduced arthropods, exotics generally have the potential to do much more harm than good. The Seven-Spotted Lady Beetle (*Coccinella septempuncta*) was intentionally introduced into Northeastern North America because of its voracious appetite for pestiferous aphids. It did help control aphids, but this exotic beetle may be outcompeting native lady beetles in the wild; the native Nine-Spotted Lady Beetle (*Coccinella novemnotata*), once the most common lady beetle of the Northeast, may now be extinct in much of its former range. The Seven-Spotted Lady Beetle is now common in agricultural settings in Alaska. *Phalangium opilio*, now the most conspicuous species of daddy long-legs around homes and in gardens on the Kenai Peninsula, was probably introduced to our area. Like the Seven-

Spotted Lady Beetle, it is beneficial in gardens, feeding on aphids and other pests, but this aggressive species will also eagerly nab and consume native daddy longlegs (See photograph).

Several of our introduced insects are forest pests. The Amber-Marked Birch Leaf Miner and the Hemlock Wooly Adelgid (*Adelges tsugae*), cause visible damage to trees, but generally do not kill their hosts. Trees in urban settings tend to exhibit more extensive damage than trees in forest settings. Others, like the Spruce Aphid (*Elatobium abietinum*) have already caused extensive leaf loss and some mortality of Sitka Spruce in Southeast Alaska. Many other potentially destructive exotic pests have not yet arrived in Alaska.

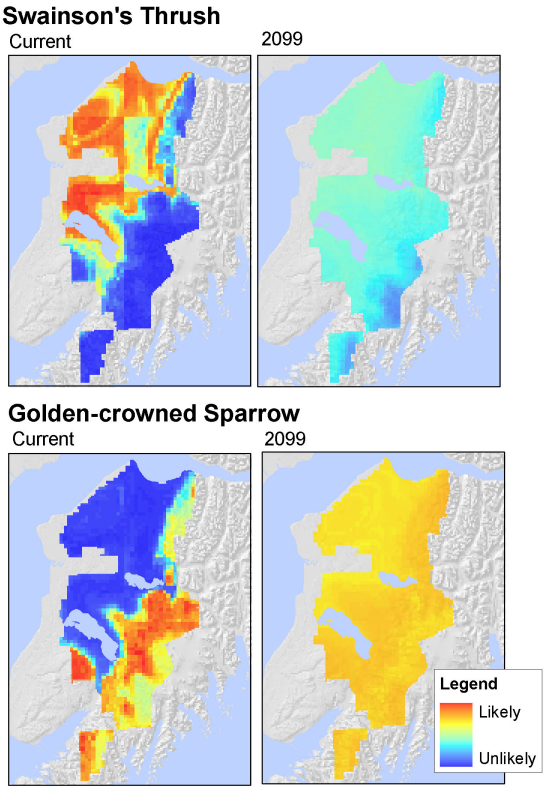
Introduced insects have the potential to significantly alter our landscapes. In order to prevent this, entomologists serving the U.S. Forest Service, the USDA Agricultural Research Service, the Alaska Division of Forestry, and UAF Cooperative Extension Service monitor at ports and other locations so that introductions can be detected early. As with exotic weedy plants, the best way to protect our natural systems from exotic insects is to prevent introductions. However, successful control and eradication projects have been demonstrated in the past, providing hope that at least some of the arthropods introduced into Alaska can be controlled.

If you have concerns about insects that you suspect may be introduced, I am happy to check specimens.

Matt Bowser has served the Kenai National Wildlife Refuge since 2004 as a biological technician, STEP student, and presently as an entomologist. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Birds and climate change together

by Dawn Robin Magness and John Morton



Kenai National Wildlife Refuge biologists are developing new tools to anticipate changes to bird distributions that may occur as the climate warms and weather becomes more variable. We are using statistical models to link where birds currently occur with historic weather conditions. The relationship between historic weather conditions and bird occurrence can then be used to forecast how birds may re-distribute themselves in the future based on climate predictions. The future climate is based on outputs from General Circulation Models run under a conservative climate change scenario in which carbon emissions stabilize and then decline.

On December 19th volunteers will spend 24 hours focused on Soldotna's 2009 Christmas Bird Count. Every winter since 1983, local birders serving as citizen scientists have braved winter conditions to count all the birds found within a 15-mile diameter circle centered on the Kenai National Wildlife Refuge Headquarters. The birds found are compiled and entered into a national database with over 100 years of observations.

With such a long history, these data have been instrumental in documenting how birds are responding to climate change. For example, scientists have used Christmas Bird Counts to investigate recent changes in the winter distributions of 305 North American species. Northward shifts in winter range occurred in 208 species over the past 40 years. Birds seem to be able to winter further north as milder weather conditions occur in January.

On the Kenai Peninsula, birds are wintering in places where they rarely did before. Short-eared Owls breed here, but migrate south in the fall. Recently, several individuals have been observed wintering in Seward and Homer. Last year a Short-eared Owl was seen flying across the Kenai Flats in January. Other new wintering species include American Robin and Rusty Blackbird.

Citizen science initiatives, like the Christmas Bird Count, are valuable for detecting changes in bird distributions because they provide a century of observations that span North America. These efforts provide early warnings of changes in species distributions as the climate warms. Early warnings are helpful, but can we make any educated guesses about what to expect with changing climatic conditions before it happens?

Kenai National Wildlife Refuge biologists are developing new tools to anticipate changes to bird distributions that may occur as the climate warms and weather becomes more variable. We are using statistical models to link where birds currently occur with historic weather conditions. The relationship between historic weather conditions and bird occurrence can then be used to forecast how birds may re-distribute themselves in the future based on climate predictions. The future climate is based on outputs from General Circulation Models run under a conservative climate change scenario in which carbon emissions stabilize and then decline.

Swainson's Thrush is a somewhat drab looking bird with a beautiful song. They are secretive, so birders are more likely to hear the flutelike, upward spiral of its song before seeing this thrush. Currently, Swainson's Thrush is a common breeder in forests on

the refuge. However, by the end of this century, this migratory bird may be unlikely to occur on the Kenai National Wildlife Refuge (see map). Other research suggests that the entire boreal forest region, which includes most of breeding range for Swainson's Thrush, will shift northward as the climate changes.

In contrast, Golden-crowned Sparrows may become a more widely distributed breeder on the refuge in the future. Currently, birders can find this chunky sparrow singing a distinctive "Oh Dear Me" every summer in sub-alpine habitats of the Kenai Mountains and Caribou Hills. But we already know that treeline is rising about three feet per year in the Kenai Mountains and encroaching into a diminishing alpine habitat in response to warmer climatic conditions. Initially, we expected that Golden-crowned sparrows would shift upward in elevation as the subalpine habitat rose with treeline. So the general expansion across the refuge was surprising. Will the refuge have more shrub habitat in the future?

The forecasted changes in bird distributions should not be thought of as an inevitable truth. Instead, forecasts should be used as thought experiments. Biologists can use forecasts to think creatively and formulate hypotheses about how and why an ecological transition might occur. Other studies and observations are then necessary to reduce our uncertainty about the new ideas generated from forecasts.

So refuge biologists have tools to anticipate change, but how should this information influence the management of refuge resources? We have management options. We can do nothing, we can manage habitats to promote the future condition, or we can manage habitats to sustain the current condition. For Swainson's thrush, we could suppress wildfires to sustain existing forests. For Golden-crowned Sparrows, we could use prescribed fires to facilitate the transition of existing forests to shrub habitats.

For the time being, we'll do nothing and allow the landscape to change as it sees fit. However, the value of this kind of modeling is that we may decide that the demise of a population or the extirpation of a species is unacceptable to you (as the public we serve) or to us (as the Federal stewards of wildlife). We may choose to engage in management activities that try to maintain historic habitat conditions for existing wildlife or facilitate habitat transitions that may be beneficial for new wildlife.

The refuge's legislative mandate is to conserve the natural diversity of fish and wildlife habitats and populations. In a world where change is "natural," we would allow habitats and populations to increase and decrease with the natural cycles and disturbances that occur in the wild. However, in a world where a rapidly changing climate is driven by man's own activities, we have begun to question what is "natural" and perhaps how we define "natural." This kind of inquiry is more than philosophical if it will affect how we manage our wildlife resources.

Dawn Robin Magness is the GIS Manager and a Fish & Wildlife Biologist at the Kenai National Wildlife Refuge. Her dissertation research at the University of Alaska focused on climate change adaptation strategies. John Morton is the Supervisory Fish & Wildlife Biologist at the Kenai National Wildlife Refuge. He is also adjunct faculty at the University of Alaska Fairbanks. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

The early days on the trapline

by Gary Titus

"It's mighty lonesome-like and drear. Above the Wild the moon rides high, And shows up sharp and needle-clear, The emptiness of earth and sky; No happy homes with love a-glow; No Santa Claus to make believe: Just snow and snow, and then more snow; It's Christmas Eve, it's Christmas Eve." The "Trapper's Christmas Eve," a poem by Jack London was first published in 1912.

The cold days filled with the soft, warm light of winter are the trappers' time in Alaska. As the leaves change colors and the cold north winds blow, the turn-of-the-century trappers moved into cabins where they would cut wood and harvest a supply of meat for the winter before the snow began to fall. After the first hard freeze they set traps and snares and began the routine of checking the trapline, returning to the cabin with the catch, skinning the animals and stretching the furs.

The trappers traveled into the wild unexplored places and braved cold, starvation and loneliness. Travel was by dog team when snow conditions were good; otherwise a pack was thrown on a dog which followed the trapper who traveled on snowshoes, or else the trapper set out by himself. Either way the traplines were hard work.

Around the turn of the century two trappers had a plan to make life easier on the trapline. Though they had used sled dogs most of their lives, the years were catching up with them and they needed to free themselves from the difficult task of maintaining a dog team. These trappers were Robert Mathison and his brother Charles who came to Alaska as young boys with their father to prospect for gold. They grew up learning to hitch up dogs behind a sled and enjoyed the excitement of mushing dogs in the wintery landscape surrounded by high mountains—many a young man's dream.

Growing up they lived in the Hope and Chickaloon River regions where in the summers they worked as prospectors and ran a freight barge in Turnagain Arm, visiting Portage, Hope and Anchorage. In the winters they trapped. Their trapping area was in the remote Chickaloon river region located on the northern Kenai Peninsula, where they built a homestead.

The planning stage concept was to develop a method of running the trapline without the year round chores of maintaining a dog team. These chores involved gathering a year round supply of food and the daily feeding and cleaning up the dog yard. It was difficult just being tied to the homestead year round, let alone the extra work. There had to be a better way.

Thus was developed the first skimobile to work an Alaskan trapline. Always mechanically inventive, the Mathison brothers made a "Skimobile" from a Model A Ford on which they placed three tracked wheels on each side. The engine protruded unsupported over the snow in front and a wooden extension of the body at the rear balanced the vehicle. The machine was described in a newspaper article as a "Rube Goldberg" affair; this term sent me to the dictionary where I found the description: "a deliberately over-engineered apparatus that performs a very simple task in a very complex fashion." Looking at the photo I believe the description fits.

With this vehicle they traveled over two traplines pulling temporary cabins built on skids. At selected sites along their traplines these cabins were left beside the trail; no longer did they need to build and maintain small log line cabins. The Mathison brothers boasted, "Better than dogs for the trapline, with it we run the line in half the time and cheaper." With their skimobile, the Mathisons opened up the country which was their home.

It was a functional contraption, but it had its drawbacks and disadvantages, and in 1958 they abandoned

the skimobile for a more conventional weasel.

After Charles died in 1960 Bob Mathison continued to live on the homestead by himself. He became friends with the animals around his home, especially the moose. He continued trapping into the 60s, running the same traplines and maintaining the trap cabins. "People think it's no good living in a cabin with no running water, but I wouldn't trade my life for anything in the world," pioneer Bob Mathison often said on visits to Anchorage. "I've always been my own boss."

Mathison's cabin was no longer so isolated. Hunters flew in, and after the pipeline for natural gas was put across the northwest Kenai Peninsula, people traveled over the cleared trail with snowmobiles and other vehicles. In January 1967, Bob Mathison's life ended tragically in a fire, which consumed his cabin.

Today trappers run the same lines as the Mathison brothers, though the snowmachines are better and the nights are spent in the warmth of their homes. Otherwise, the routine of checking the trapline, returning to the cabin with the catch, skinning the animals and stretching the furs remains the same. Traplines are still hard work in the beauty of the Alaskan winters.

Gary Titus has been a Backcountry Ranger, Cabin Manager, and Historian at the Kenai National Wildlife Refuge since 2000. He has been hiking on the Kenai at every available opportunity since 1979. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Soldotna Area Christmas Bird Count slated for Saturday, December 19, 2009

by Elizabeth Jozwiak

The 110th annual Christmas Bird Count season is under way; tens of thousands of volunteer birders are scouring their designated areas in over 2000 circles this Holiday season throughout North America. Once again local birders from the Kenai/Soldotna area are invited to participate in the Soldotna Annual Christmas Bird Count to be held tomorrow.

The Audubon Christmas Bird Count (CBC) is an early-winter nationwide bird census, where volunteers follow specified routes through a designated 15-mile (24-km) diameter circle, counting every bird they see or hear all day. It's not just a species tally—all birds are counted all day, giving an indication of the total number of birds in the circle that day.

All individual CBC's across North America, including Canada, are conducted in the period between Dec. 14 to Jan. 5 each year, and each count is conducted in one calendar day in a given area. Birders from Seward, Anchorage, Homer, and other areas of Alaska also participate in this annual event.

The history of how the Christmas Bird Count began is quite interesting! The CBC began over a century ago when 27 conservationists in 25 localities, led by scientist and writer Frank Chapman, changed the course of ornithological history.

On Christmas Day in 1900, the small group posed an alternative to the "side hunt," a Christmas day activity in which teams competed to see who could shoot the most birds and small mammals. Instead, Chapman proposed that they identify, count, and record all the birds they saw, founding what is now considered to be the world's most significant citizen-based conservation effort—and a more than century-old institution.

Since Chapman's retirement in 1934, new generations of observers have performed the modern-day count. Today, over 55,000 volunteers from all 50 states, every Canadian province, parts of Central and South America, Bermuda, the West Indies, and Pacific Islands, count and record every individual bird and bird species seen in a specified area.

The data collected by observers on these Audubon Society Christmas Bird Counts over the past century have allowed researchers, conservation biologists, and interested individuals to study the long-term health and status of bird populations across North America. Christmas bird count data are now being used to see how birds may be reacting to global climate change.

In a recent Refuge Notebook article, biologist Dawn Magness reported on how birds are now wintering in places they rarely did before. The Christmas count data are valuable for detecting changes in bird distributions because these observations now provide over a century of long-term data. Some species of birds are now being seen further North in the winter months as milder temperatures become more common.

The Soldotna Christmas Bird Count originated in 1983 with the center of the 15-mile diameter circle being the Kenai National Wildlife Refuge headquarters and covering most of the Soldotna area, including a good stretch of the lower and middle Kenai River.

Although the count was discontinued in 1992, it restarted in 1999 and has been running ever since with the dedication of local birder Jack Sinclair, who has been the Audubon local compiler of the data each year.

Some of the more common birds seen during the Soldotna CBC have been the Bald Eagle, Black-billed Magpie, Common Raven, Common Redpoll, Pine Grosbeak, Pine Siskin and Boreal and Black-

capped Chickadee.

An unusual sighting during last year's 2008 count was an adult Slaty-backed Gull spotted at the Soldotna Landfill. This Asiatic species has been recorded on the last four consecutive CBC's. Other "seldom seen" species included a Boreal Owl and two Northern Hawk Owls. Toby Burke also glimpsed a small flock of at least seven Horned Larks which were observed scattered within a flock of Snow Buntings on the Kenai Flats during the CBC last year.

Birders, or anyone interested in participating in this year's Christmas bird count, should meet at the Kaladi Brothers Coffee on Kobuk Street in Soldotna at 9:00 am so that birding groups can be assembled and observation areas assigned.

CBC participants are organized into groups—or field parties—by the organizer or compiler of each Count. Each field party covers a specific area of the 15-mile diameter circle on a specific route. Inexperienced birders will be grouped with more seasoned CBC veterans to help familiarize them with where to go and what to look for.

For anyone wanting to pre-register, or just interested in the Christmas Bird Count, there is a wealth of information available online at http://www.audubon.org/bird/cbc/, or on the local Keen Eye Peninsula Birders website at: http://www.keeneyebirders.org.

Each participant should dress warmly, and try to bring a good set of binoculars and a bird identification book for species most often found in Alaska. You may also want to bring a camera to document any rare or unusual sightings. There is a $5 fee per field participant which will help defray the cost of production and publication of the 110th Christmas Bird Count issue of *American Birds*.

Anyone having an active bird feeder in the count area is also encouraged to help. Counting the single highest number of a species at a feeder at any one time, including any unique feathered visitors, is a big help to the count. All you will need to do is contact the local compiler so that you may report your results on the Count Day. No fees are charged for persons under 18 years of age, or for those planning to survey their backyard bird feeders during the Christmas Bird Count.

Participants do not have to be experts, but only have a desire to get outside and look for birds. The birding effort normally concludes at dusk (about 4 pm) or when weather precludes any measurable returns.

After a great day of birding, all participants are invited to submit their tally sheets and birding photos during a potluck social at 6:00 pm hosted by the Kenai National Wildlife Refuge. This potluck will be at the Refuge's Environmental Education log cabin located next door to the Kenai NWR headquarters/parking lot on Ski Hill Road. Please bring a dish to share.

For more information, contact Toby Burke at the Kenai NWR 262-7021 or Jack Sinclair at 262-7817. If you come across a chickadee or northwestern crow with a deformed bill, please report it to USGS—Alaska Science Center on-line automated reporting system at http://alaska.usgs.gov/science/biology/landbirds/beak_deformity/index.html. This information will contribute to an important regional study on the causes of bill deformities in Alaska birds.

Liz Jozwiak is a wildlife biologist for the Kenai National Wildlife Refuge. To report unusual bird sightings or hear what local birders have been seeing, call the Central Peninsula Bird Hotline at 262-2300. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Seabird observations from the Gulf of Alaska

by Toby Burke

Early this past September I was fortunate to be designated a marine bird and mammal observer for the U.S. Fish and Wildlife Service's Migratory Bird Branch in Anchorage. I was charged with systematically censusing marine birds and mammals in conjunction with a Global Ocean Ecosystem Dynamics (GLOBEC) oceanographic research cruise aboard the U.S. Fish and Wildlife Service's research ship, the M/V Tiglax, in the Gulf of Alaska.

Accordingly, on September 13th I boarded the Tiglax in Homer where the ship's crew immediately pulled anchor and set a course for Seward, where they would take on the GLOBEC research crew which consisted of University of Alaska Fairbanks faculty and graduate students.

Between Homer and Seward the Tiglax traveled through the near-shore waters of the Kenai Peninsula's outer coast, generally within five or less miles of its deeply incised shore and often remarkably close to its prominent headlands. The weather was somber gray, deeply overcast with intermittent banks of fog, but the winds were fair and the ship plied easily through the light swell. These conditions were conducive to marine bird and mammal surveying.

In all honesty, probably only 5% of an observer's time is devoted to observing and identifying marine mammals, the overwhelming majority being devoted to observing and identifying the far more numerous and diverse marine avifauna. Most observers are chosen primarily for their seabird identification skills but if an observer is brutally honest, equally important is their ability to endure long hours on a ceaselessly rolling and pitching deck in less than ideal weather, all too often with nary a bird in sight.

On the initial 16 hour transit from Homer to Seward most of the bird species observed were locally breeding species that are commonly encountered in similar near-shore waters of the Kenai Peninsula such as Glaucous-winged and Herring Gulls; Black-legged Kittiwakes; Horned and Tufted Puffins; Double-crested, Red-faced, and Pelagic Cormorants; Common Murres; Marbled Murrelets; and the occasional Parakeet and Rhinoceros Auklets.

For the most part the truly pelagic, or open ocean, species such as storm-petrels, shearwaters, fulmars, and albatrosses were absent as one would generally expect. These off-shore birds are infrequently encountered in near-shore waters. Because of this most people, short of marine ornithologists and fishermen, are not generally familiar with these oceanic bird species.

Once the GLOBEC research crew boarded, we set out from Seward straight out in to the Gulf of Alaska, stopping at 10 mile intervals at established stations to conduct oceanographic sampling until we were 130 miles off shore and beyond the continental shelf.

This oceanographic sampling focused primarily on chemical oceanography during the day, more specifically marine chemistry, by collecting water samples throughout the entire water column from surface to ocean bottom. At night oceanographic sampling focused primarily on biological oceanography, more specifically sampling for planktonic organisms, by trawling in between the established stations.

I was able to conduct marine and seabird censuses, continuous line transects, only during daylight hours when the ship was traveling between sampling stations. Usually that meant relatively short transects

approximately one hour in duration but occasionally transects lasted six, eight, or even twelve hours. These very long transects occurred when traveling between far flung sets of oceanographic sampling stations and of course when traveling between Homer and Seward.

Though we encountered dozens of whales and porpoises, easily the highlights of the cruise for this "bird nerd" were the thousands of pelagic seabirds observed far off shore in the Gulf. Black-footed and Laysan Albatrosses; Northern Fulmars; Sooty, Short-tailed, and Buller's Shearwaters; Fork-tailed and Leach's Storm-Petrels; Mottled Petrels; Pomarine Jaegers; and South Polar Skuas made up the majority of the pelagic seabird community. We generally started observing them 30 or miles off shore and easily in their greatest densities in the continental shelf area, 80 to 130 miles off shore, as expected.

As expected? Yes, because nutrient upwelling from the cold waters of the Gulf of Alaska basin flowing up slope and mixing with shallower waters of the continental shelf provide for enhanced production of phytoplankton. Phytoplankton, being the principle primary producers of the world oceans, forms the base of the marine food chain. Zooplankton feeding on phytoplankton is in turn fed upon by higher tropic organisms such as fishes; marine mammals and birds feed on the fish or directly on the zooplankton itself. Consequently, many marine organisms reach their greatest densities at or near these shelf upwellings.

So, despite having to endure fog, high winds, big seas, the endless (and sometimes violent) motion of the ship's deck under one's feet, and often bird-less skies, the week spent traversing the Gulf of Alaska this past September eventually inspired this would-be ornithologist to get off shore more often to observe the underappreciated, seldom seen but abundant avifauna of the Gulf of Alaska's continental slope.

Toby Burke is a refuge biological technician who is intrigued by the status and distribution of Alaska and Kenai Peninsula birds and enjoys birding with his wife and family. To report or listen to interesting local bird sighting call the Central Kenai Peninsula Birding Hotline sponsored by Kenai National Wildlife Refuge at 262-2300. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.

Sterling Highway reconstruction project for milepost 58 to 79 hits the fast lane

by Rick Ernst

It looks like the Sterling Highway between mileposts 58 (east junction with Skilak Lake Road) and 79 (junction with Kenai Keys Road) may be reconstructed sooner rather than later. This section of highway is on the state's list of high moose-vehicle collision areas.

An interagency working group has been grappling with ideas about how to make this dangerous road through the Kenai National Wildlife Refuge safer for motorists and wildlife. The working group consists of Alaska Departments of Transportation and Public Facilities, Fish and Game, and Public Safety; Federal Highway Administration, Alaska Moose Federation (an Anchorage non-profit) and the U.S. Fish and Wildlife Service.

To get an idea of how much wildlife crosses this stretch of highway, we set up a telephone hotline and asked people to call in their wildlife sightings. To help people pin down the locations of their sightings we installed new mileposts in half-mile increments along the Refuge part of the highway (mileposts 58-76).

Since November 2005 we have received 276 calls on the wildlife hotline, which reported 29 black bears, 18 brown bears, 117 caribou, 12 lynx, and 265 moose.

We also put GPS-collars on 59 moose and 9 caribou, and after two winters of data collection we have recorded more than 1107 crossings of the highway within the project area.

The hotline phone number (262-2300) is advertised on highway signs, through a radio transmitter (1170 AM) located at milepost 62.5, and with brochures and posters displayed in post offices, food stores, and visitor centers. Information and a map are also posted in kiosks at both the east and west entrance to Skilak Lake Road. Unfortunately, the radio transmitter is not presently working, but the hotline phone is alive and well.

We have also obtained wildlife-vehicle collision data from the State Troopers, as well as the Alaska Department of Transportation and Public Facilities. This dataset includes not only road-kills but also collisions where wildlife were hit but not recovered. Between 2000 and 2007 there were at least 174 collisions with wildlife along this stretch of highway. This total includes 24 black bear, 3 brown bear, 5 caribou, and 142 moose.

The interagency working group is asking for your support in continuing to call the wildlife hotline (262-2300) anytime you see wildlife as you drive the Sterling Highway through the Kenai Refuge. Please provide the following information:

(1) What kind of animal you observed (moose, caribou, wolf, etc.)

(2) How many animals (cow and calf, sow with 2 cubs)

(3) Location (between what milepost markers – MP 69.5 and MP 70)

(4) Date and Time of your sighting

We greatly appreciate all the calls that we have received. This information will be used to help recommend mitigation measures—such as wildlife overpasses, wildlife underpasses, and crosswalks, and fencing—to reduce wildlife-vehicle collisions. We hope to continue the hotline for several years after the highway reconstruction to help judge the effectiveness of the mitigation measures. You can see a map showing where motorists are reporting wildlife along this section of the Sterling Highway on the Kenai Refuge website:

http://www.fws.gov/filedownloads/ftp_kenai/maps/sterling/map_wildlifehotline.pdf

Rick Ernst has been a wildlife biologist and pilot at the Kenai National Wildlife Refuge since 1993. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.